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An index to the ninety-fifth volume of THE RAILWAY GAZETTE *covering the issues from July 6 to December 28, 1951, has been prepared, and is now available free of charge on application to the publisher*

Much Ado About Nothing

ON the front page of *The Daily Telegraph* of February 20 a good deal of space, especially in these days of paper shortage, was devoted to a story based on the fact that the engine which drew the funeral train to Windsor on the previous Friday was not the original *Windsor Castle* which hauled King George V's funeral train on the same journey in 1936. In fact, as British Railways immediately stated when an enquiry was made, the locomotive used was the *Bristol Castle*, which was built in 1948. It carried the nameplate and number plate of No. 4082, the original *Windsor Castle*, which was constructed in Swindon Works in April, 1924. This transfer was made because the Western Region authorities felt that, as the old *Windsor Castle* was undergoing overhaul at the time, it would be a fitting tribute that the engine of the Royal funeral train should bear the same name as that used on the occasion of the funeral of King George V. There is nothing unique in the switching of nameplates of engines for special occasions, and in this case there was certainly good justification for the change. Very little sentiment could have attached to the use of the original *Windsor Castle*, for it has undergone considerable change since it was first built. For example, it has been re-boilered eleven times, the tender has been changed on twenty-seven occasions, new cylinders were fitted in 1936, and there have been seven changes of wheels and axles. The question of the substitution of the fittings, which were restored to the original locomotive on the day after the funeral, probably would not have been raised publicly but for the observation of some railway enthusiasts along the line of the funeral journey, who noted the more modern appearance of the locomotive hauling the train.

Railway Staff

THE areas most affected by the local manpower shortages on British Railways are those such as London and the industrial Midlands where employment is available with more regular hours and better pay, and more attractive conditions than railway work. The operating and certain civil engineer grades are the most affected; there has been difficulty in recruitment and loss of experienced men expensive to train in both time and money. Steps taken to overcome local shortages in operating staff include, besides the curtailment of passenger services, diversion of goods traffic from points where shortage of train crews delays traffic, and rostering of crews so as to spread the calls for manpower to where the shortage is less acute. Signs are now reported of an improvement in the "black areas." Fewer men are said to be leaving the service, and there have been cases of men who had left rejoining. Nevertheless, the situation for the railways as a whole remains serious, as the most recent statistics, for the last four-week period of 1951, show. No doubt the railway wage increases effective from November have helped; but the main cause of local improvement seems to be unemployment caused by the steel shortage and, even more, a resultant desire for the security that railway work provides.

Permanent Way Maintenance

IN railway civil engineering the shortage of labour has had far-reaching effects. Among the most important of these is the continuance of many old and the imposition of new permanent-way speed restrictions on main lines. These result in the relatively low—compared with 1939—passenger train speeds for which British Railways, through no fault of their own, have been taken to task by critics who cite Continental train speeds as examples of what should be done. The year 1951 ended with 219 speed restrictions in force on principal main lines; this was 18 fewer than a month, but 14 more than a year previously. A long-term remedy, assuming that the railway manpower shortage continues, is the mechanisation of track maintenance, the progress of which has been described in previous issues of this journal; obviously the supply of equipment creates its own problems, not least of training men in its use. Of more immediate significance is the employment of Italian permanent way labour. The number so far introduced is small in relation to the total British staff in conciliation civil engineering grades, and distributed over the four Regions that serve London, with a majority in the London Midland Region. Here also the remedy creates its own problems, linguistic and social, which are being tackled with energy.

Great Northern Railway (Ireland)

FOR the year ended December 31, 1951, the Great Northern Railway (Ireland) had a deficit of £675,284. The addition of the 1950 debit balance of £296,962 gave a total debit balance of £972,246 to be carried forward. Gross recipts were £3,742,158, a decrease of £21,741; but

for strikes in the Republic, estimated to have caused a loss of £60,000 in receipts, the receipts would have been higher than in 1950. Passenger receipts, at £1,341,959, increased by £7,364, but goods receipts, at £1,335,283, were down by £28,727. The total expenditure was £3,925,321, an increase of £232,912; it included an additional £190,882 for wages, £25,271 for coal and oil, and £161,759 for materials. The entry into service of 20 new diesel units brought the passenger mileage worked by railcars to 30 per cent. of the whole. In conjunction with Coras Iompair Eireann, the Belfast-Dublin " Enterprise " service was extended to Cork. The company continued operating almost throughout the year with its own resources and did not call on the Governments of Northern Ireland and the Republic for assistance until mid-November.

I.C.C. and International Transport

IN 1951, the International Chamber of Commerce, the International Union of Railways, and the International Road Transport Union were asked by the Inland Transport Committee of the United Nations Economic Commission for Europe (E.C.E.) to examine jointly a policy for co-ordination of transport and to state the measure of their agreement thereon. Meetings between the three bodies were held in Paris last November, under the ægis of the I.C.C., and a joint report was issued reflecting a remarkable degree of unanimity. The report was considered by the E.C.E. in Geneva last month, as recorded in our issue of January 25; it was well received by the delegates of the several Governments, which are now considering its recommendations. Meanwhile, the I.C.C. has reconstituted its Commission of Transport Users under the chairmanship of Mr. A. G. Marsden, Transport Adviser of Lever Bros. & Unilever Limited, and Chairman of the Transport Committee of the I.C.C. British National Committee. The Commission held its first meeting in Paris on January 24. Its members are at the same time members of the I.C.C. technical committees for railway, road, sea, and air transport. It will advise the Council of the I.C.C. and the technical committees on questions of special interest to transport users.

Overseas Railway Traffics

A FALL in railway operating revenues by $339,796 was recorded by the International Railways of Central America during the year 1951. Operating revenues for the year amounted to $13,126,431 and net revenue from railway operations was down to $1,199,136 at $1,073,214. Net revenue for December decreased by $75,787 to $95,419. The advance in Antofagasta (Chili) & Bolivia traffics continued in the fortnight ended February 8. Receipts for the two weeks were £108,060 higher at £296,080, and on the aggregate traffics for the current six weeks are better by £238,130 at £821,680. Gold Coast traffics for December rose by £72,605 to £378,543 and the total for 39 weeks now amounts to £2,473,919, as compared with £2,265,546 for the equivalent period of 1950-51. At January 19 South African Railway receipts for 42 weeks of the financial year 1951-52 had made a total advance of £8,271,548 and amounted to £80,114,580. Traffics for the week were up by £214,175 at £1,959,342.

British Transport Commission Statistics

THE aggregate figures for 1951 given in *Transport Statistics* for the last four-week period of the year show that the earnings of the British Transport Commission from its carrying, docks, hotels and catering activities were £600,479,000, against £540,561,000 for 1950. Of the additional £60 million, British Railways contributed £30 million (almost entirely from goods and parcels), British Road Services £15 million, road passenger transport some £5 million, London Transport £3·4 million, and hotels and catering £1·5 million. Comparison between 1951 and 1950 is complicated by the increases in railway freight, canal, dock, and road haulage rates at different times, by the introduction of the London Passenger Charges Scheme in October, 1950, by alterations in provincial bus fares, and by acquisition by the Commission of road haulage and provincial bus undertakings. The 10 per cent. advance in railway freight, dock and canal charges, effective from April 16 last, is likely to bring in more than the £20 million expected of it in a full year, apart from the further 10 per cent. increase from January 1, 1952. How far the £60 million additional revenue in 1951 compared with 1950 was offset by rising costs it is as yet impossible to state.

Changes in Railway Transport Methods

MANY of the recent changes in methods of dealing with railway traffic were mentioned by Mr. T. H. Hollingsworth, Commercial Superintendent, Scottish Region, in his paper " The Changing Pattern of Railway Transport," read to the Railway Students' Association last week. He stated his view that in contrast to previous periods, the rate of change today was rapid enough to be seen by the most casual onlooker. Tracing recent developments in wagon design, he pointed out that the apparent unwillingness until nationalisation to introduce high-capacity wagons was caused largely by the high proportion of privately-owned wagons and factors which made owners unwilling to adopt higher capacities. He referred to modern trends in goods station layout, as at Birmingham Lawley Street, and in mechanical and other methods of handling freight, to alterations in goods traffic working made possible by nationalisation—with the saving of £100,000 a year by rationalisation of yards in the Scottish Region — and to the 36 per cent. increase in ton-miles in 1938-50 achieved with a diminution of some 11 per cent. in the total wagon fleet. Mr. Hollingsworth clearly outlined the problem of branch line closing against the background of the road/rail problem.

Starting Away without Thinking

THE accident near Fishguard & Goodwick on July 11, 1951, was one of the very few head-on collisions in this country involving a passenger train. As will be seen from our summary of Brigadier C. A. Langley's report in this issue, an auto-train driver started on receipt of the guard's signal, although he had not received the electric train staff. The section in advance was occupied by an approaching freight train. He failed also to notice the starting signal at danger. He had been attending to a lubricator glass and said that must have distracted his attention. The signalman, who had acted incorrectly in admitting the auto-train to the platform in the way he did, endeavoured to attract the departing driver's attention, but his shouts and whistles passed unheard amidst the explosion of detonators placed on the line to give a send-off to a wedding party. Fortunately the results of the collision were not serious. The report makes certain recommendations and stresses the importance of prohibiting any misuse of detonators in this way. Appropriate action in that direction has been taken.

Developments in Vacuum Brake Equipment

A PAPER read before the Institution of Locomotive Engineers on February 20, by Mr. G. C. Marsh, referred to recent developments in vacuum brake equipment. For many years, especially during the early part of this century, the vacuum automatic brake remained almost unaltered in its original form except on the G.W.R., where Churchward introduced many new features, engine-driven vacuum pump, direct admission valves and other innovations, some of which have become standard on British Railways. The question of adequate ejector capacity first came into prominence, said Mr. Marsh, in the 1930's, when large freight locomotives were introduced in India and South Africa for hauling long vacuum-fitted trains. For long vacuum-fitted freight trains the addition of automatic slack adjusters had contributed considerably to efficient braking, whilst the adoption of the lower working vacuum of 16 in. or 18 in. for freight working, coupled with the provision of more powerful ejectors, had enabled brake

release times to be drastically reduced. The paper, which included a survey of the developments in the braking of diesel-mechanical railcars, diesel locomotives, ejector performance, exhausters and the electro vacuum brake, is an important contribution on this subject.

Eastern Region Bo+Bo Locomotives

ALTHOUGH the Bo+Bo electric locomotives now operating between Wath and Dunford Bridge are at present engaged on freight haulage only, they are designed as mixed-traffic machines capable of performing a variety of duties, which, when later stages of the Manchester-Sheffield electrification project are completed, will include fast and stopping passenger service. It is fortunate that the L.N.E.R. was able to complete the prototype of the class before the war halted further progress on the scheme, for, first on tests on the Manchester-Altrincham line and subsequently on extended trials in Holland, the performance of this locomotive has yielded valuable data which have influenced the improved design of its successors. The Metropolitan-Vickers Electrical Co. Ltd. is responsible for the electrical equipment of the locomotives, for which the mechanical parts, described elsewhere in this issue, have been manufactured in British Railways workshops. The most interesting features of the design are undoubtedly the regenerative braking—a great asset on the long gradients and the first use of the system on a main line in this country—and the transmission of power through resilient gearing, some units having helical springs and others rubber pads between gearwheel boss and rim.

Mr. W. S. Graff-Baker

LONDON TRANSPORT lost a great engineer, with a high and well-deserved reputation, and a wide circle of friends was parted from a trusted and valued colleague, by the death of Mr. W. S. Graff-Baker last Friday. Mr. Graff-Baker, a biographical note of whom appears elsewhere in this issue, had been Chief Mechanical Engineer (Railways) to the London Transport Executive since 1935 and at the time of his death had the distinction of a longer record of service in the grade of Officer—since 1922—than any other Officer or Chief Officer of London Transport now serving.

He was the third generation of his family to be professionally associated with electric traction. His grandfather was well known in the United States as a builder of electric street railway trucks; his father was a pioneer in electric tramway development in this country. Though educated in Britain and subsequently naturalised, Mr. Graff-Baker maintained close links with the U.S.A. and paid one of his frequent visits to that country as recently as last year.

Mr. Graff-Baker has left his impress on the Underground railways of London. He was possessed of a flair for invention and design and an enquiring and creative mind. During his term of office as Chief Mechanical Engineer he was responsible for major improvements in the design of rolling stock, lifts and escalators. To his design have been built all the latest types of rolling stock now running on, or on order for, both tube and surface lines, including the lightweight District Line stock—of which deliveries have now begun. Faster escalators, more efficient automatic door equipment, faster and roomier trains, improved car equipment design incorporated in the latest type of rolling stock all bear testimony to the ever fresh quality of mind and the greatness of his conception in design. The tube stock introduced in 1938 with roller axle and suspension bearings and cam-operated electrical control equipment was one of his most important contributions to the design of electric rolling-stock subjected to very arduous operating conditions.

Apart from his abilities as an engineer, Mr. Graff-Baker was a man of wide and general culture and interests, and had a deep appreciation of the visual arts. He was also a likeable, lively, challenging colleague and a leader of men who was full of humanity and understanding. As a companion he was a witty and lively conversationalist, quick at repartee, and will be greatly missed by his many friends. The energy which he brought to everything he undertook was well summed up at a staff function by the late Mr. E. Graham, then Mechanical Engineer, who said that no one in the Chief Mechanical Engineer's Department worked harder than the man at the head of it.

Mr. Graff-Baker contributed greatly from his knowledge to the technical literature of engineering and was responsible for a number of valuable papers to leading professional Institutions. As recently as January 4 of this year, he presented a paper on " The Construction of Bogie Design with Particular Reference to Electric Railways " to the Institution of Mechanical Engineers, though illness prevented him from being present at the meeting to deliver his paper. He was President of the Institution of Locomotive Engineers for 1944-45 and 1945-46 and was a very active Member of the Council. He was also a Member of the Council of the Institute of Transport from 1937 to 1940. He took an active part also in the affairs of the Transportation Club, of which he was a Member of Council.

Queensland Railways

WE have received from Mr. T. E. Maloney, Commissioner for Railways, Queensland, a copy of his administration report for the year ended June 30, 1951. It was another year of records, including £19,191,817 gross earnings, £18,974,547 working expenses, and despite enhanced rates and fares there was a deficit of £1,492,203 or £26,157 greater than in the previous year. Interest on capital represented £1,709,473. It is noteworthy that revenue per train-mile increased during the year from 17s. 9d. to 20s. 11d., and expenditure on the same basis from 17s. 8d. to 20s. 8¼d.*

The following are some of the more important results of working during the year:—

	1949-50	1950-51
	(Thousands)	
(*a*) 3 *ft. 6 in. gauge lines*—		
Passenger-journeys	32,185	33,961
Passenger train-miles	6,409	6,753
Goods tonnage carried	6,656	6,863
Goods train-miles	11,100	11,592
	(£ thousands)	
Passenger, parcels, &c., receipts	4,017	4,440
Goods traffic receipts	11,514	14,752
Total earnings	15,531	19,192
Working expenses	15,468	18,975
(*b*) 4 *ft. 8½ in. gauge lines*—	(Thousands)	
Passenger journeys	181	184
Goods tonnage carried	287	318
	(£ thousands)	
Total earnings	456	580
Working expenses	400	464

The increase in passenger journeys on the 3-ft. 6-in. system was due mainly to heavier suburban traffic despite keen tram and bus competition and more private cars on the roads. The slight drop in country journeys is accounted for by intensified air competition and by floods putting many lines out of action for long periods. This latter set-back makes the all-time record figure of tonnage carried, 6,113,261, the more remarkable; it exceeded the 1949-50 previous record figure by 163,178 tons. The increase in volume of coal carried was over 100,000 tons. Increases in rates and fares were introduced piecemeal on July 1 and December 18, 1950, and on June 1, 1951. Of the £3,506,051 increase in expenditure over the 1949-50 figure, higher wages accounted for £1,781,255, and enhanced costs of stores and coal and contingencies for £1,037,670.

The floods already mentioned were unusually serious and wide-spread; damage was sustained in every division throughout the State, and the cost of repairs is estimated to be about £200,000. Another severe handicap was the shortage of manpower in almost all grades throughout the year. Well over 2,000 more men were required including 20 technical officers. Moreover, though 43 new locomotives—half of them Beyer-Garratts—and 1,951 new wagons were placed in service during the year, these were still insufficient to handle the heavy traffic offering. It is interesting to note that the administration estimates that the 22 Beyer-Garratts in traffic at the close of the year had " avoided the running of approximately 195,000

* None of the preceding figures includes the short length of 4 ft. 8½ in. gauge lines south of Brisbane

goods and assistant train miles" in the preceding nine months.

During the year 11 British- and 10 American-built diesel-electric locomotives were ordered. They are intended for working the air-conditioned and other important mail and passenger trains; a lighter type is to be obtained for secondary line services. Of the 1,951 wagons, 1,000 are four-wheel hopper coal wagons and 600 are bogie open wagons supplied by the Metropolitan Cammell Carriage & Wagon Co. Ltd. An order for a further 3,000 wagons was placed with a Melbourne firm but it is understood that they also will be Metro-Cammell-built. In all some 5,400 goods vehicles were on order on June 30, 1951, including 500 from the Gloucester Carriage & Wagon Co. Ltd. Such large requirements emphasise the shortage during the year under review, which with the floods and labour deficiency make it all the more creditable that a 4,448 million gross ton-mileage should have been achieved, a figure surpassed only in the two peak war years.

In view of its comparatively small size, the Uniform Gauge Railway, or 4-ft. 8½-in. gauge section from South Brisbane to the New South Wales border, has little space devoted to it in the report. Its route-mileage is only 69 as compared with the 6,467 miles of the 3-ft. 6-in. gauge lines in the State. Passenger journeys increased from 181,295 to 183,911 and goods tonnage from 284,088 to 316,695 as compared with 1949-50; gross ton-mileage rose from 79,531,649 to 87,717,172. The corresponding gross earnings were £456,098 and £580,106 and working expenses £399,691 and £464,300. There was thus as satisfactory increase in net revenue of £59,399 or 105 per cent. over the 1949-50 figure.

Modernising Track Maintenance

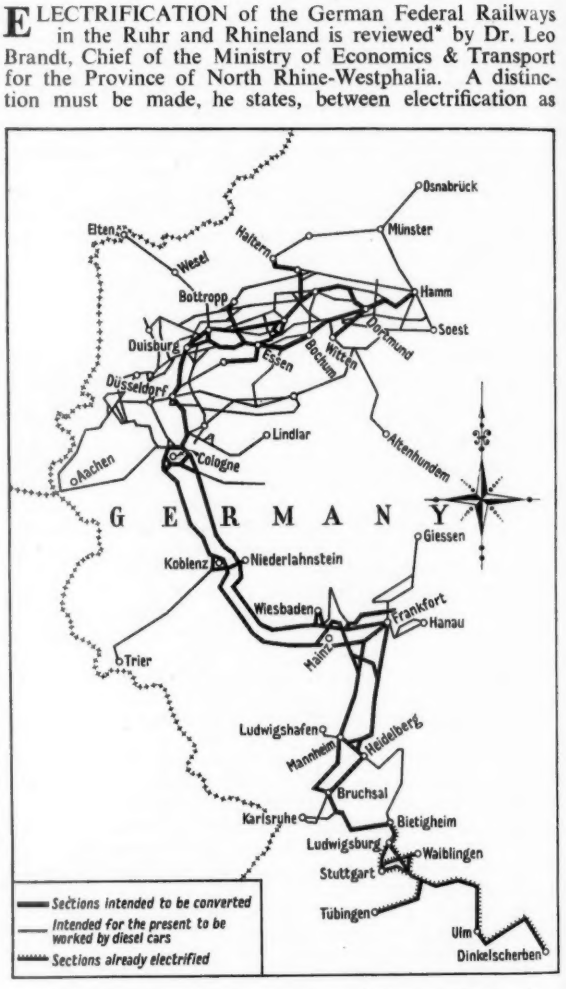
THE Railway Executive is sparing no pains to remedy the present shortage of permanent-way labour and at the same time to improve track maintenance. Recent announcements on the employment of Italians and the demonstration of mechanised appliances for permanent way maintenance, described in an article in our issues of November 2 and 9, at Marylebone Goods Depot on October 31-November 1, 1951, have now been supplemented by an account in the December issue of the *British Transport Review*, entitled "Productivity on the Permanent Way," by Mr. J. C. L. Train, Member of the Railway Executive for engineering matters. Mr. Train points out that there is a deficiency of about 8,500 men below the 60,000 required to maintain the high standard of track demanded by modern loads, speeds, and in some cases electrification. After describing the essentials of adequate maintenance of the formation and of the upkeep and renewal of the track, he enumerates the manifold responsibilities of the permanent way staff. Instability in the formation is accentuated by ever-increasing train loads, speeds, and vibration, and a new study of soil mechanics is necessary to combat this defect. In the first part of our article, referred to above, some of the more usual measures to restore formation stability were explained. The plant used for this purpose includes excavators, dozers, unloaders, dumpers, frong hammers, and compactors. To these Mr. Train adds the drying-out of the soil by electro-osmosis and the waterproofing of the surface of the subsoil by mixing with it fuel-oil containing a small quantity of paraffin wax.

In the second part of our article, other machines for the maintenance of the track were described, such as rail-creep adjustors, ballast riddles, Matisa ballast tampers and cleaners, and gang trolleys. The article in the *British Transport Review* directs attention to measured shovel packing and the different methods of laying prefabricated track, (a) using a diesel-electric crane with a streamlined rear profile to clear structures and passing traffic, and (b) with twin cranes having retractable horizontal jibs mounted in tandem. Relaying a single line has to be treated differently with the aid of light gantries running on specially laid rails parallel to and outside the track. The gantries straddle low trolleys or standard-gauge trucks carrying prefabricated lengths of track.

Among the power tools Mr. Train mentions are saws, grinders, drills, borers, screwing machines and many others. He also gives some instructive notes on the realignment of track and remodelling of junctions to enable speed restrictions to be removed; transition curves; the now-standardised limiting values for cant; inter-gang prize competitions as incentives to better work; and experimental reorganisation of gangs for lengths up to 60 miles, employing small units for walking the length, and big mechanically equipped and transported gangs for the larger jobs. His article leaves no doubt that the civil engineers, by adopting so many and mainly-mechanical methods, are at once reducing the handicap of labour deficiency and maintaining and renewing the track more efficiently.

Electrification in Western Germany

ELECTRIFICATION of the German Federal Railways in the Ruhr and Rhineland is reviewed* by Dr. Leo Brandt, Chief of the Ministry of Economics & Transport for the Province of North Rhine-Westphalia. A distinction must be made, he states, between electrification as



Sketch map showing sections of German Federal Railways intended to be electrified

such and rehabilitation of war-damage to the railways. The electrification projects have been mentioned in *The Railway Gazette* from time to time, and notably in the issue of August 25, 1950.

Besides electrification, there are other measures for improvement and rationalisation, such as increased use of diesel railcars and railbuses, modernisation of rolling stock (in so far as it goes beyond mere rehabili-

* *Schiene und Strasse* (*Rail and Road*). Dortmund: Verkehrs und Wirtschafts-Verlag G.m.b.h., 1951

tation), development of container services, introduction of new signalling equipment, reorganisation of workshop practice and mechanisation of goods and parcels handling. All these are under examination by the Federal Railways, and are being adopted where circumstances justify the expenditure, but they rank after electrification in the solution of the problems of the Federal Railways in its highly-trafficked lines in the Ruhr-Rhine area, particularly as regards the road/rail problem.

The sections of line to be electrified have been chosen to enable electrification to prove of full value with the completion of the first stage, and to effect the maximum saving in working costs. This first stage covers the point of heaviest rail traffic density in the whole area, whether long-distance or local. In passenger traffic, local and inter-urban services will be increased, on electrification, in the Cologne, Essen, and Wuppertal Divisions, where traffic originating in a highly-industrialised area amounts to over a million passenger-journeys daily.

The significance of the electrification scheme in the sphere of freight transport, general economic development, town planning, demography, and so on, already has been brought to the notice of the public by a press and lecture campaign. Dr. Brandt mentions aspects discussed by the provincial and local authorities when the scheme was mooted: the connection between electrification of local passenger services and housing, particularly the building of housing estates, and economy in coal consumption resulting in savings in foreign exchange. Calculations made by the chemical industry put this annual saving at about three times the capital expenditure of DM. 30,000,000 required for electrification, as the saving in coal in the first stage alone, between Hamm and Remagen, is estimated at 180,000 *tonnes*, and the chemical industry calculates an exchange value of DM. 500 a *tonne;* thus there would be a saving of DM. 90,000,000 a year.

The growing number of traffic accidents on and rising costs of maintaining trunk roads give an increasing importance to the reduction of the volume of road traffic such as may be expected from a return of passenger and freight traffic to the railways. The 70,000 road accidents a year in the Province of North Rhine-Westphalia cost the taxpayer DM. 100,000,000 annually, and the costs of upkeep of the roads rose from DM. 8,000,000, in 1914, to DM. 80,000,000 in 1950. Electrification also is highly desirable, states Dr. Brandt, as a means of modernising steam-operated passenger services now worked with obsolete rolling stock and at excessively slow speeds—a fast train from Cologne to Dortmund is allowed 180 min. for the 73 miles, which should be halved by electrification.

Freight Movement on British Railways

(By a Correspondent)

NO. 13 of the 1951 series of *Transport Statistics* rounded off the record of a disappointing year for British Railways. Little can be learned from a comparison of the results for the four-week period to December 30 last with the corresponding period of 1950, when abnormal difficulties reduced the volume of traffic and lowered the general level of operating statistics. To judge how far British Railways recovered their former standard of performance by the end of 1951, there is need for a survey of the work done in the closing periods of the four years since nationalisation.

Table 1 below shows that originating tonnage in December last was 559,000 tons above 1950 (2·7 per cent.), but 261,000 tons below 1949 (1·2 per cent.) and 943,000 tons below 1948 (4·2 per cent.).

1.—FREIGHT TRAIN TRAFFIC ORIGINATING. (THOUSANDS) FOUR-WEEK PERIOD TO END DECEMBER

Year	Merchandise and livestock Tons	Minerals Tons	Coal and coke Tons	Total Tons
1948	4,371	4,647	13,027	22,045
1949	4,034	4,666	12,663	21,363
1950	3,868	4,496	12,179	20,543
1951	3,978	4,700	12,424	21,102

The decrease of nearly 9 per cent. in merchandise since 1948 points to the diversion of traffic to road and water. More surprising is the decrease since 1948 of 4·6 per cent. in coal and coke forwardings. The Railway Executive gave much publicity to certain large clearances from collieries before Christmas, 1951, but these efforts were evidently spasmodic. They are not reflected either in the total tonnage declared or in the total number of coal and coke wagons forwarded. On the contrary, Table 2 shows a decrease in the number of wagons loaded out with all classes of traffic, compared with December, 1948, and, 1949, and a drop of 14,000 in the number of coal and coke wagons from 1950.

2.—LOADED WAGONS FORWARDED (THOUSANDS) FOUR-WEEK PERIOD TO END OF DECEMBER

Year	Merchandise and livestock	Minerals	Coal and coke	Total
1948	1,135	463	1,236	2,834
1949	1,041	447	1,204	2,692
1950	992	418	1,160	2,570
1951	998	430	1,146	2,574

In considering these figures, it should be borne in mind that the average wagon capacity grows steadily. The average wagon load at starting point has risen since 1948 by half a ton to 8·66 tons. It is worth noting that in December last the London Midland Region lifted its average load of merchandise to over four tons for the first time. The use of large wagons is a boon to the railway operator by reducing the wagon miles he has to work as shown in Table 3.

3.—TOTAL WAGON MILES (THOUSANDS). FOUR-WEEK PERIOD TO END OF DECEMBER

1948	349,299
1949	330,386
1950	310,824
1951	326,302

Wagon miles were 6·5 per cent. fewer in December last than in 1948, in spite of an increase of three miles in the average length of haul of all traffic.

The net ton-mileages set out in Table 4 confirm that less work was done in December, 1951, than in 1948. The difference in ton-miles worked was 2·6 per cent.

4.—NET TON-MILES. FOUR-WEEK PERIOD TO END OF DECEMBER

1948	1,727 million
1949	1,638 "
1950	1,576 "
1951	1,682 "

The last of our tables compares the statistics which measure freight movement. The improvement on the slow motion during the last four weeks of 1950 is obvious. Though freight train miles increased by 3·1 per cent., train engine hours in traffic were reduced by 4·1 per cent.

5.—STATISTICS OF FREIGHT MOVEMENT. FOUR-WEEK PERIOD TO END DECEMBER

	1948	1949	1950	1951
Freight train miles (000's)	10,589	10,234	9,984	10,292
Train engine hours in traffic (000's) ...	1,433	1,312	1,356	1,300
Ton-miles per train engine hour ...	997	1,035	959	1,067
Wagon miles per train engine hour ...	202	209	189	207
Freight train speed, m.p.h.	7·39	7·80	7·36	7·92

Broadly, all Regions except the Western bettered 1949 as well as 1950 results. The Western Region's statistics, once very good, went awry towards the end of 1950, but still excel the London Midland Region's figures. In freight train speed the Scottish Region led the field with 9·57 m.p.h. Only the London Midland Region's disappointing record of 6·68 m.p.h. kept the average for the whole system below 8 m.p.h.

This statistical analysis proves that December, 1951, was a normal period in the operation of British Railways. As in the two previous four-week periods, there was no trace of the extra 5,000,000 tons of traffic which the Railway Executive expected to have to carry this winter. In the last 12 weeks of 1951, the tonnage of merchandise and livestock was less by 42,000 (0·3 per cent.), while 355,000 more tons of minerals were carried (2·4 per cent.) and 404,000 more tons of coal and coke (1 per cent.). The Railway Executive foresaw increases of nearly 1 per cent. in merchandise, 4·2 per cent. in minerals and 3·3 per cent. in coal and coke. It will be interesting to see whether its business forecast is nearer the mark in the early months of this year. Even the U.S.A. Shippers Advisory Boards, with some 30 years' experience, are not always correct in estimating future wagon loadings.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Vital Role of Railways

January 11

SIR,—I noticed recently in the press a report of a speech by an influential personage in the transport world advocating the scrapping of the entire railway system of the United Kingdom and its replacement by a great fleet of buses and lorries running on arterial roads built on the railway rights-of-way.

The intelligence of the promoter of such a scheme—and of those who support him—seems to be on a level with that of the planners who, a few years ago, were reported to be blue-printing an underground station beneath Hyde Park, large enough to deal with all the traffic of the existing termini north of the Thames!

One wonders whether these road transport fanatics have such short memories that they have already forgotten the part played by the railways in the war. It is essential that we should never be entirely dependent on road transport, using imported fuel, however magnificent our arterial roads might be.

Those who consider that the railways are now a back number might consider that almost every country in the world has a railway system of some sort and, even under present conditions, there has been no noticeable rush to scrap these systems entirely. In recent years a surprising amount of new construction has been undertaken throughout the world, even in Western Europe with its comparatively dense network of lines, and more is under consideration. It is hardly likely that the administrations concerned have not carefully weighed up the pros and cons of rail and road transport.

Yours faithfully,

E. E. SMITH

Castle View, Stagshaw Road, Corbridge

Traffic Apprentice Schemes

February 14

SIR,—I was interested to read the comments in your February 8 issue on the Railway Executive traffic apprentice scheme announced in 1950.

This scheme, so far as selection of suitable candidates is concerned, is admittedly much in advance of anything conceived by the managements of the former railway companies. Trade union representation on the final selection board and the three-to-one proportion of candidates from the staff are in themselves indicative of efforts towards fairness in this direction.

It does seem, however, that the same careful consideration has not been given to the training, ultimate placing, or the effect of the appointments on the rest of the staff. Three years is a short time, previous experience notwithstanding, in which to gain an insight of the working of the Operating, Commercial and Motive Power Departments from small station to Regional Headquarters level. I should prefer to see a supplementary period of one or even two years probation at a station or depot, where the apprentice would really be in charge and dependent on his own efforts to see the work through instead of, as now, an appointment at a highly classified station where such responsibilities devolve on senior clerical and supervisory staff.

The fundamental weakness is, however, the apparent lack of appreciation by the Executive of the reaction of the rest of the staff to the scheme. To quote your own words, it is an opening for anyone joining the service but, unfortunately, it is an opportunity for those people only. Does not the Railway Executive realise that there are, on their staff, many individuals, over the age limit but, and—this is important—not too old, who have had considerable experience and are probably better fitted for higher executive positions than any product of a training scheme? In the pursuit of more efficient and economical working the Executive should be concerned with the resentment of such staff towards the appointment of traffic apprentices to the higher classified positions. That this is not so is evident from the lack of an alternative form of accelerated promotion (which is what traffic apprenticeship really is) for individuals disqualified from the scheme by age alone.

In conclusion, let me say that, in principle, I am not opposed to a traffic apprentice scheme but I cannot see any good resulting from the present one until some attention has been given to the points I have raised.

Yours faithfully,

G. W. HOWE,
Stationmaster, London Midland Region

162, Park Lane, Wolverhampton

Closing of Branch Lines

January 24

SIR,—It has been announced that passenger services on the Weymouth-Portland-Easton branch will be withdrawn on March 3. The station at Portland, which of late has been out of all proportion to the traffic it handles, will thus become one of the largest " ghost " stations in the country. Three trains were seen on a recent visit to the branch and they took not more than a dozen passengers between them. This was midweek, and there may be better patronage on Saturdays.

This brings me to a point to which the Railway Executive could give study: why not run trains on Saturdays only? In an area like that served by the Portland branch the only time that the railway is likely to attract any passengers left over from the buses is on a Saturday. It would also draw a certain amount of football traffic as Westham Halt is very near the ground of the Weymouth Football Club.

The nearest approach to this suggestion, which is in force, appears to be on the Western Region Blaengarw branch where there are three trains up the valley on Mondays-Fridays and seven on Saturdays, the last reaching Blaengarw at nearly midnight. Adoption of this arrangement should present no operating difficulties on the Portland branch, where there is a motive power depot handy, and no uneconomic light engine mileage would be involved as there would be if one tried to work the Newcastle Emlyn, Malmesbury, or Brixham branches on this principle.

Yours faithfully,

J. F. BURRELL

80, Longmead Avenue, Bristol, 7

Merits of American Steam Traction

February 9

SIR,—Avowed steam locomotive enthusiasts will find it difficult to conceal an understandable feeling of glee when reading Mr. Novak's factual accounts of diesel performance in your January 18 issue.

As an executive member of the newly-formed New York Central's Citizen Commuter Committee, which considers the pending application of this carrier for a substantial increase in commuters' fares as unjustified, on the grounds that losses in long-distance passenger traffic should not be made up by the highly lucrative commuters' service, allow me to make further comments on North American diesel locomotives.

On January 4, 1952, during a hearing before the New York State Public Service Commission of the application of the New York Central System for an increase in intrastate commuter rates, the Commission's attorney said: " Last September (1951) the ' Twentieth Century Limited ' was on time only 50 per cent. of the time, while the record for the ' Empire State Express ' was only 33·3 per cent." These lamentably low figures are an eloquent argument for the urgent need of North American Railways to scrap the diesel locomotives and to revert again to the reliable and economic coal-burning steam locomotive.

It is absurd to expect a 4,000-b.h.p. two-cab unit diesel locomotive which develops only 3,000 h.p. at the rim of the driving wheels, to match a Norfolk & Western "J" class coal-burning steam locomotive, which sustains at least 5,600 h.p. at the rim of the drivers. To use three 2,000-b.h.p. diesel units would render the locomotive operating costs totally prohibitive. The motive power investment then would be some $700,000 for the diesel compared with some $300,000 for the incomparable Norfolk & Western "J" class, which costs 18 cents a mile in repairs and accumulates 300,000 locomotive miles per engine failure.

The deterioration in the quality of diesel oil predicted long ago, no longer permits the use of the full rated diesel h.p. output. Also the "souping" of diesel locomotives, due to unburnt fuel oil, creates spatter marks over the trains with ungainly oil deposits, and coach windows and roofs present a serious cleaning problem. It is a pity to see the gleaming beauty of a stainless steel train marked with oil-covered handrails and door handles, after an overland journey behind a diesel.

The now discontinued "Cincinnatian" was 95·1 per cent. on time in 1948 over a most difficult road between Washington and Cincinnati, with heavy grades and sharp curves. This record was held by the "P7" class Pacifics, built by Baldwins in 1924.

I urge in all sincerity that railways "pause and plan" before making rash decisions on changing from steam to diesel power.

Yours faithfully,

FRANK FREEDNER

Buckingham Apts., Scarsdale, N.Y., U.S.A.

Railway Carriage Design

February 9

SIR,—It is a far cry from the 'seventies of last century to the present, and I am astonished at Canon Fellows's letter in your February 1 issue. In nearly three-quarters of a century the habits of the nation have radically altered, and the proof is contained in the fourth paragraph of Canon Fellows's letter, where he says that all-Pullman trains to Brighton were *resumed* in 1897. Surely it was the changing habits which led to that resumption of the "Sunday Pullman Limited" and the inauguration of the British-built all-Pullman "Southern Belle" (now the "Brighton Belle") in 1907 with a daily service.

Has Canon Fellows ever heard of the "Bournemouth Belle," the "Golden Arrow," the "Yorkshire Pullman," the "Queen of Scots," not to mention other all-Pullman trains whose names are now household words? Do all these trains run empty? They were introduced between the wars, and others have been placed in service since 1945.

I make considerable use of the Bognor and Portsmouth electric services, and I note that even when there is room in the compartment stock, there are quite a number—sometimes a preponderance—of passengers in the centre-corridor motorcoaches. Here I must support Colonel Brooke-Hitching, who suggests headrests midway across the seat. This is found in the aforesaid motorcoaches with two seats each side of the gangway. These centre-corridor coaches like many modern compartment corridor coaches have the advantage of large windows, giving a better view of the scenery. End-door coaches, whether compartment or centre corridor, have also, if suitably constructed, the advantages of greater longitudinal strength. Escape in an accident can be effected through the large windows, and I am glad to see that this is being allowed for in the new standard B.R. coaches. Draughts can also be kept above the heads of the passengers. It is illogical to put doors along the length of the corridor on one side only of the coach. What happens when such coaches arrive with the doors away from the platform? It would accelerate loading and unloading if the doors of end-door coaches were not restricted to the width of the old stage-coach doors. They should be as wide as those used in some Continental countries—notably Germany—so that passengers with suitcases can descend more speedily.

It is a pity that the Railway Executive is not more realistic about the number of seats to a side in third class compartments. It seems odd, not to say uneconomic, now that first class coaches are built with three seats aside, not to put four seats aside in third class coaches. Fewer coaches would be needed, and the money saved could be used for more diesel railcars, thus avoiding the defeatist policy of closing branch lines. Bus services are, I consider, "broken reeds" even when said to run "in conjunction" with the railway.

In conclusion, I must correct Canon Fellows on the subject of the South Eastern Car Trains. These cars were bought by the Pullman Car Co. Ltd. immediately after the 1914-18 war and remodelled as Pullman cars. They did not have a very long life, and were replaced as soon as new Pullmans could be built.

Yours faithfully,

AUBREY F. INGLEFIELD

Longmeadow, Prinsted, Emsworth, Hants

Nameboards on Express Trains

January 22

SIR,—The full-size designation boards carried at the head of the "Night Ferry" and "Golden Arrow" trains, at once grip the imagination, and create wanderlust.

The boards carried by the Continental expresses from Liverpool Street Station are not at all impressive and are barely discernible, especially when the trains are running at speed. Let us see full-size boards, reversible for the down and up runs, carrying the wording:

LONDON	HOOK OF HOLLAND
HARWICH	HARWICH
HOOK OF HOLLAND	LONDON

What is meant, and the route referred to, would at once be apparent.

Yours faithfully,

C. E. MASTERSON

27, Linden Street, Romford

Publications Received

Port of Bristol Official Handbook, 1952. Bristol 1: F. G. Warne Limited. 5 Marsh Street. 9½ in. × 7 in. 128 pp. Illustrated. No price stated.—The official handbook of the Port of Bristol Authority gives full particulars of the dock system of the port, consisting of the City, Avonmouth, and Portishead Docks, of their modern equipment, and of the trades of the city and port. There is useful information on transport and storage facilities, dues, exemptions and abatements on goods, and Bristol trade and commerce associations. Some well-produced half-tone illustrations depict mechanical handling and other port equipment and the loading and unloading of various types of cargo.

Colliery Lubrication.—The importance of efficient lubrication of modern colliery equipment, in diesel-driven locomotives, and miscellaneous mechanical equipment, is stressed in a booklet published by C. C. Wakefield & Co. Ltd. Efficient lubrication of the various types of equipment is explained by diagrams. The subjects include the care of machinery, oil storage and distribution, and recommended lubricants.

Railway Standard Charges Scale. Birmingham, 2. The Railway & Shipping Publishing Co. Ltd., 12, Cherry Street. Price 15s.—This is a completely revised issue of the publication based on the latest increases in rates and dated December 31 last. It lists all present-day British railway standard charges for all classes 1 to 21, at all mileages from six to 750 miles. In addition to station-to-station rates, carted and (or) delivered rates are shown, so that no calculation has to be made when requiring a railway standard charge for conveyance of any class of goods to any destination.

THE SCRAP HEAP

Time Signals

An important concession has lately been made by the South Eastern Railway Company on the representation of the Astronomer Royal for the establishment of electrical communication between the Royal Observatory, at Greenwich, and the London-Bridge Railway Terminus. . . . Wires are to be laid underground from the Royal Observatory to the Lewisham station by the Electric Telegraph Company, and thence to London along the line of railway by the South Eastern Railway Company. From the London station wires will diverge to Westminster, to the Royal Exchange, and to the Central Telegraph Station at Lothbury.

The objects in view are:—

1. To transmit Greenwich time to and from the clock at the New Houses of Parliament and the Royal Exchange.

2. To transmit Greenwich time throughout the kingdom by the various lines of electric telegraph.

3. To compare the transits of stars at Greenwich with the same at Paris. . . . The transmission will be automatic.

Railway companies will find the advantage of these arrangements, for they will have Greenwich time "at their fingers' ends," and will really be able to keep uniform time. — *From "The Times" of February* 11, 1852.

S.S.F. & S.I.R.

The drawing reproduced below of Hogsnorton Station was sent to us by Mr. Gillie Potter, the stage and radio comedian, and is by Mr. J. Morris, a railwayman, of Elworth, Cheshire. Hogsnorton is the temporary terminus of the Skegness, Solway Firth & Scilly Islands Railway, of which, Mr. Potter states, only the two-and-a-half mile stretch between Hogsnorton and Little Twittering has been completed. It was proposed to work the line with the *Rocket* after George Stephenson had found that its age precluded further working of heavy traffic on the Liverpool & Manchester Railway. A more modern locomotive, *J. B. Priestley*, was obtained; this, says Mr. Potter, functioned fairly well if occasionally allowed to blow off steam.

The drawing shows some of the rolling stock originating on various railways, with an Alexander Allan 2-2-2 6-ft. single built in 1840-60.

Transport and Colonial Development

To develop the colonies the first requirement is transport facilities, but the capital goods required for that purpose are made of the raw materials, mainly steel, which are required for the rearmament programme; also the skilled workers required to manufacture those raw materials into transport equipment and other requirements for development are the very men required to make tanks and guns.

There are, therefore, very sound economic reasons why there must be some restrictions in the supply of both finance and capital goods to the colonies. Yet we are still encouraging the colonial peoples and private enterprise to think a full colonial development programme can be maintained and colonial development is outrunning the basic requirements such as transport, water and power supplies.—*From a letter to "The Economist."*

Transport Act and Passenger Fares

The London Passengers' Association has called for a Royal Commission to examine the effect of the Transport Act, 1947, on the fare-paying public.

A letter to local councils suggests that until such time as the proposed Royal Commission has published its findings, the recommendations concerning fares made recently by the Transport Tribunal should be placed in abeyance.

A statement attached to the letter says that there is something radically wrong with a system under which people who have to use systems controlled by the British Transport Commission must contribute towards the central charges, which in turn are used to reduce "the enormous losses" sustained since the nationalisation Act came into force, while people who travel in provincial centres pay nothing towards these central charges.

ROUND THE STATION:

Shoeshine Sam

I'm Shoeshine Sam of Waterloo
(That's not my name, but it will do),
And every morning, wet or fine,
My old alarm says "rise and shine!"

In my smart red jacket I'm on the job
From morn till night, from the bustling mob
Of the business hours to the favoured few
Who can take their time at Waterloo.

I've cleaned the shoes of the good and great
And, I very much regret to state,
I must have titivated the brogues
Of a tidy lot of distinguished rogues.

I've spent a life-time upon my knees,
Polishing pedal extremities,
I was here when the lads went off to war
In "fourteen-eighteen," and long before.

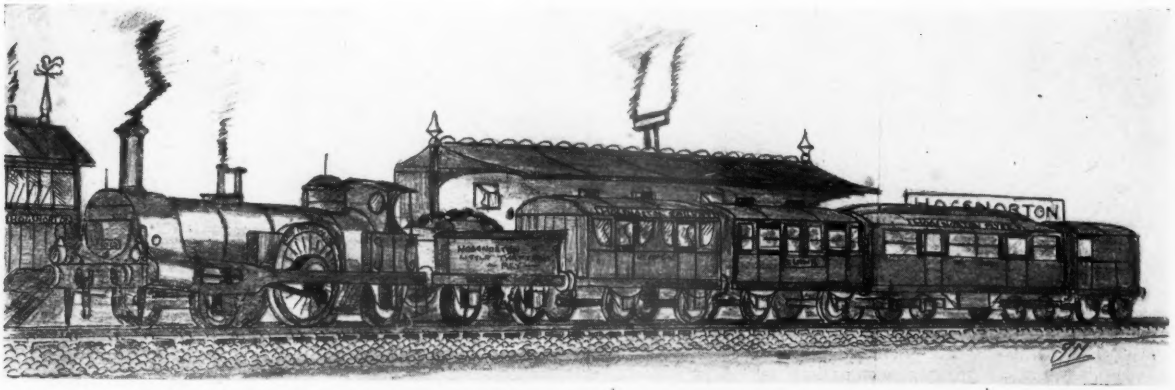
I've seen the captains and kings depart,
I've seen folks off on a brave new start,
In the hope of a turn of fortune's wheel,
Or at least a chance of a squarer deal.

A station-master without the "hat,"
Polished and silky, was something that
You'd never encounter years ago—
Not for him the modern incognito.

But my happiest memory is of the night
when bombs set the whisky store alight
And the fragrant vapour for days and days
Kept the hardest heads in a mellow haze.

I've heard of people prepared to swear
They can judge men's minds by the shoes they wear;
I just take what Dame Fortune sends,
And do my best for their latter ends.

A. B.



Impression of Hogsnorton Station, S.S.F. & S.I.R., showing Alexander Allan Crewe-built locomotive, and coaches acquired from various railways

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

NEW ZEALAND

Passenger Services

Passenger services have not yet been restored to their frequency before the strike, nor does it appear likely that this will be possible for some time. Some local trains, with cancelled express trains in the South Island, were restored in October and November, and there was a general restoration of all long-distance passenger trains for four weeks at the height of the Christmas holiday season. Extra trains also were provided during this period. With one or two minor exceptions, express and country passenger trains reverted after the holidays to the skeleton timetable which operated during the winter of 1951. Continuation of these severe restrictions is to enable the railways, with their depleted staff, to handle essential heavy goods traffic.

The South Island "Limited" express trains, withdrawn in April, 1951, as a coal shortage measure, were not restored until October 29. They were withdrawn again on February 2 for an indefinite period. Express trains on provincial routes now run twice a week.

WESTERN AUSTRALIA

Marble Bar Railway Closed

The Port Hedland-Marble Bar line ceased working on November 1 last. It was opened in 1912, from Port Hedland, on the north-west coast, to serve the gold mining area at Marble Bar, 114 miles inland, and was the only railway operated in the north-west of the State where it was isolated from the main railway system.

Mining development did not reach expectations, and in recent years the main business has been the carriage of supplies for and produce from pastoral properties in the area and water for the town of Port Hedland. The normal service was one train a week each way. Since its inception the railway accumulated a loss of nearly £580,000. During the war the line was prosperous, but afterwards traffic fell, and with the coming of intense road competition the question of closure was considered, particularly as heavy expenditure on re-sleepering had become necessary.

The Government decided to construct an all-weather road between Port Hedland and Marble Bar and close the railway. A water supply to be piped to Port Hedland would obviate the necessity for hauling water by rail.

Although not yet completed, the all-weather road is fit for service, and traffic is now handled by road hauliers. The last train worked over the line by the Railway Department ran on October 27.

UNITED STATES

The "Merchants Limited"

A short time ago the "Merchants Limited" of the New York, New Haven & Hartford Railroad, one of the best-known trains in the Eastern States, which up till then had carried Pullman passengers only, was opened also to "coach" passengers. The increase of traffic so attracted has resulted in the running, daily from January 7, of an "Advance Merchants Limited" in both directions between New York and Boston. The main "Merchants Limited" trains continue to leave Grand Central Terminal and Boston South Station at 5 p.m., calling in each direction at New Haven, Providence, and Back Bay (Boston); the "Advance Merchants Limited" starts 5 min. earlier, and is nominally non-stop, though a working stop is necessary at New Haven to change the electric locomotive used between New York and New Haven for the diesel-electric power working the trains between there and Boston.

The two sections of this train, which take their place in the hourly expresses between New York and Boston, are the fastest on the service, allowed 4 hr. overall for the 229·1 miles (57·3 m.p.h.) and for this reason command an extra fare. Both sections are composed of streamline stock, and include parlour cars, lounge with two-way radio-telephone service, dining and grill cars, and reclining seat coaches.

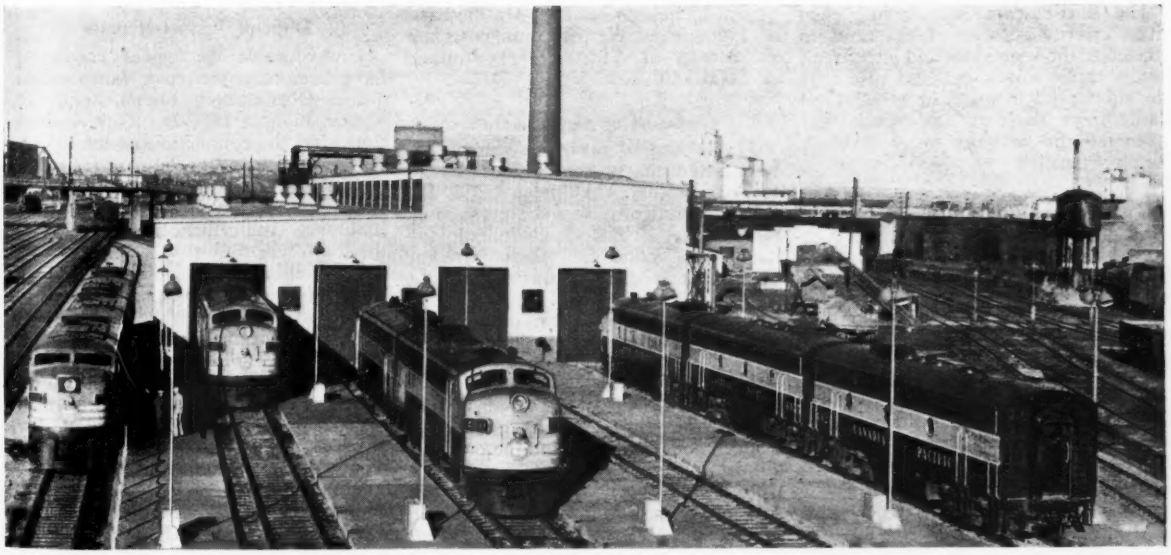
IRELAND

Improvements at Dun Laoghaire

C.I.E. is to spend £6,000 on alterations to track at Dun Laoghaire Pier. Improvements in platform and Customs amenities are being carried out by the Board of Works.

The turntable at the end of the pier will be replaced by two crossovers and buffers. The double line will be extended as far as the level crossing, which will have new 30-ft. gates and the underbridge will also be widened to carry the additional track.

Servicing C.P.R. Diesel Locomotives



Canadian Pacific Railway diesel service plant at Alyth, where locomotives are prepared for operating over the Rocky Mountains section between Calgary and Revelstoke

When these improvements have been carried out it will be possible to accommodate more trains at the pier, and the new crossover will give greater operating flexibility.

ITALY

"White Arrow" Tourist Train

Winter sports enthusiasts have now a special Sunday train jointly organised by the Italian State Railways and the Swiss Federal Railways, and operating between Milan and Andermatt, the winter sports centre in the Gotthard. The northern terminal of the train is Göschenen, at the northern portal of the Gotthard tunnel, 116 miles from Milan. From Göschenen the journey is completed by the 2½-mile metre-gauge Schöllenen Railway leading steeply up to Andermatt.

The train, named "La Freccia Bianca del San Gottardo" ("Saint Gotthard White Arrow") covers the distance northbound in 4 hr., and southbound in 3½ hr. It operated from Milan first on February 10, but an experimental service was run from Chiasso on February 3. Faido, another winter sports centre, 21½ miles south of Göschenen, and Airolo, at the southern end of the Gotthard tunnel, are intermediate sports centres served.

Bari-Pescara Electrification

Electrification of the 496-mile main line between Bologna and Lecce along the Adriatic coast is to begin soon. The section between Bari and Pescara is to be the first to be converted. The distance between Bari and Pescara is 186½ route-miles comprising 94½ miles of double track.

The electrification of the Bari-Foggia section was approved in 1936 but the work was subsequently postponed in favour of the electrification of the Spezia-Leghorn section of the Rome-Genoa main line.

The Bari-Pescara section has been given priority because of the need to accelerate the vegetables and citrus fruit export traffic. It is believed also that the substantial increase in mineral oil traffic from Bari to the north has prompted the decision to embark on the electrification.

SWITZERLAND

Control Signals at Level Crossing

An unusual system of road traffic control signals has been installed at the level crossing of the Winterthur-Zürich highway and the Winterthur-Bülach line of the Swiss Federal Railways, at Töss near Winterthur.

The Winterthur transport authorities have recently substituted trolleybuses for trams; the last route converted has its temporary terminus on the Winterthur side of the level crossing. It is intended eventually to replace the level crossing by an underbridge and extend the trolleybus route beyond the crossing. The temporary terminal facilities for the trolleybuses are much restricted, consisting merely of a lay-by on the arrival side of the road. Departing vehicles must make a 180 deg. turn across the traffic, and in the immediate vicinity of the gates so that there is a danger of road traffic being held up on the level crossing.

To eliminate all risks, Hasler A.G., of Berne, has designed a special road traffic signal system, in conjunction with the Swiss Federal Railways, the Winterthur transport authorities and the highway departments concerned. Normal-type three-aspect traffic lights have been installed at the Zürich side of the gates and on the Winterthur side of the gates beyond the trolleybus lay-by. These signals normally show green, but switch automatically, first to amber and then to red, whenever the gates are about to be closed or a trolleybus is about to move out of the lay-by. The green lights are automatically restored when the gates are opened, or when the trolleybus has safely turned and crossed.

FRANCE

Electrification in the North

Plans for electrification of the main line from Valenciennes to Thionville are well advanced, according to the journal *Le Monde*. The work will begin this year and is expected to be completed in 1954. Electric power will be obtained from the industrial supply line at 25,000 volts and 50 cycles. Substations will be limited to seven. Three will be specially constructed for the S.N.C.F. at Fourmies, Chauvency, and Mont Saint Martin. Four others, at Valenciennes, Mohon, Landres, and Thionville, will be used jointly by the S.N.C.F. and Electricité de France.

Eighty-five heavy locomotives with six motor axles, capable of hauling freight trains of 1,350 *tonnes* on gradients of 1 in 100 and 1,750 *tonnes* on 1 in 125 will be required. They will displace 304 steam locomotives which will be available for use on other lines or will be held in reserve. On the basis of 1950 prices, electrification costs are estimated at fr. 12,000 million (£12,000,000).

Transport of Sugar in Bulk

The refining of sugar has been an important industry in France since early in the last century. At present it is the normal practice to bag the crystallised raw sugar at the factories before moving it to the refineries. During recent months tests have been carried out jointly by the S.N.C.F. and a large sugar manufacturing firm in the conveyance of crystallised sugar from a factory in Abbeville to a refinery in Paris.

Two high-sided open wagons were adapted for the experiments, one with a wooden floor and body and the other an all-metal wagon. All joints were sealed with adhesive cellotape and a strong paper covering, after which the whole of the interiors of the wagons were covered by used sacking.

A mechanical belt fed by a hopper funnel was used to load the wagons. A rate of 40 tons an hour was achieved; if the apparatus were completely adapted for this purpose, a rate of 80 tons an hour could be reached.

Bleuse-Borne Viaduct

Reconstruction, begun in January, 1951, of the bridge across the Escaut Canal at Bleuse-Borne on the Valenciennes-Lille line, is expected, weather permitting, to be completed next month. The bridge, which could not be launched into place in accordance with the more normal bridge building technique of the S.N.C.F., was assembled piece by piece on its final site. It is of all-metal construction, and when completed will be the largest metal railway bridge of its type in Europe. It is a single-span bridge, without intermediate support, and will be 341 ft. long; its construction has involved the use of some 1,800 *tonnes* of steel and 400,000 rivets.

AUSTRIA

New Vienna Stadtbahn Station

On December 22, the reconstructed Westbahnhof station of the Vienna Stadtbahn (City Railway) was inaugurated. The station is connected by a 120-yd. subway with the new Westbahnhof main line station. A prominent feature of the reconstructed Stadtbahn station is the fluorescent lighting.

DENMARK

Doubling of Jutland Main Line

The doubling of the north-south main line in Jutland between Aalborg and Randers (50 miles) is making satisfactory progress. The track has been realigned where necessary, and stations have been reconstructed. The only remaining single-track section is between Svendstrup and Arden (15 miles).

WESTERN GERMANY

Difficult Tunnel Repairs

Unfavourable geological conditions have dictated major repair works on the ½-mile Oberbeishein tunnel, south of Kassel, built in 1876-78. Only a short time after the completion of the tunnel, the heavy pressure of the rock led to the partial destruction of the masonry lining for which, rather unwisely, soft sandstone with lime cement mortar had been used. Where water was encountered, the tunnel vaulting had been covered with tin sheeting which was found to have disappeared when the recent repair works were begun in 1939.

Since 1939 nearly one-half of the tunnel has been completely relined so that the vaults are likely to withstand the roof pressure for a long time. Operating requirements called for day and night shifts under unfavourable working conditions, as the service had to be fully maintained. The track section concerned was bridged by a strong timber scaffold which served as a working platform for the removal and renewal of the tunnel roof.

First British Main-Line Freight Electrification—3*

Training of motormen, and mechanical features of mixed-traffic Bo+Bo locomotives

WITH the introduction of the electrically-hauled trains from Wath to Dunford Bridge, men accustomed to working steam locomotives were trained as electric locomotive drivers. Initially, six men were chosen for training as leading motormen, to enable them to act as assistants to a qualified instructor. They were given training at Ilford depot on the Liverpool Street-Shenfield line, and also visited the works where the locomotives have been built. A further 64 men were trained as motormen in groups of approximately twelve at Wath Depot, the course of training lasting four weeks.

At the present time, 15 men are being trained in motormen's duties, to enable a dual link to be formed at Mexborough steam depot. They will be used to cover the electric work at Wath for holidays and sickness, but will work steam trains when not required for electric workings. The first week's instruction combines classroom work with practical. As the men have little or no knowledge of electrical equipment, instruction is given on the basic electrical principles. Each man is given a booklet giving items which will be discussed in the coming lectures. This is found to be desirable as the men can give the instructors their full attention without having to compile their own notes. These notes are supplemented by diagrams drawn on a blackboard.

From the second week onwards, the training is wholly practical. The trainees, accompanied by a leading motorman, drive a light engine over a short stretch of line in Wath Exchange Sidings. For the third week the men work, under supervision, trains over the fairly level stretch between Wath and Wombwell Exchange Sidings. They learn to control a train, and obtain experience in accelerating and braking with a load.

The final week's training, which is given on the section between Wath and Oxspring Junction, gives the men experience with the regenerative braking system, one of the most important features of the locomotive.

Locomotives

A total of 65 locomotives is being provided for the complete electrification scheme; 58 are of the Bo+Bo type, of which 30 are in service on Stage I. The prototype Bo+Bo locomotive—then L.N.E.R. No. 6000—ran trials on the Manchester-Altrincham line in 1941, and only minor modifications to electrical details have been made for the remainder of the order. This locomotive formed the subject of articles in our March 7, and October 17, 1941, issues. In 1947, No. 6000 was sent to Holland for trials and service on the Netherlands Railways, and is still in service there, having covered approximately 325,000 miles hauling express passenger and freight trains.

Largely as a result of this service in Holland, improvements have been made to the layout of the electrical equipment, notably in the driving cabs, which have been enlarged. The master controller, instruments, and other cab equipment have been built into an attractive sloping desk and inclined instrument panel, giving added comfort and ease of control for the driver. Electric window heaters have been added in front of the driver to maintain clear vision.

Vokes type dry-air filters have been fitted as part of the mechanical parts to all ventilating louvres to maintain a clear atmosphere inside the body and thereby reduce maintenance on electrical equipment. Cooling air for the traction motors is drawn from inside the body.

For the first time on British Railways regenerative braking is being used in commercial service on this stage of the electrification. All locomotives are fitted with the equipment to enable regenerated energy to be fed back into the contact system when trains are being worked down the heavy gradients on this section. The advantages are improved control of unbraked trains leaving the brake blocks cool, reduced wear on the brake blocks, and reduction in overall energy consumption.

All axles are driven, making the total weight available for adhesion. The bogies are fabricated from one-inch thick steel plates. At the outer ends a prefabricated assembly, with the buffer beam as a base, carries the buffers and drawgear, brake shaft and cylinder. This fabrication is built as a unit and then welded to main frames. At the inner ends a prefabricated unit with a 1-in. flanged plate arranged as a continuation of the main frame carries the articulation joint and handbrake shaft on a

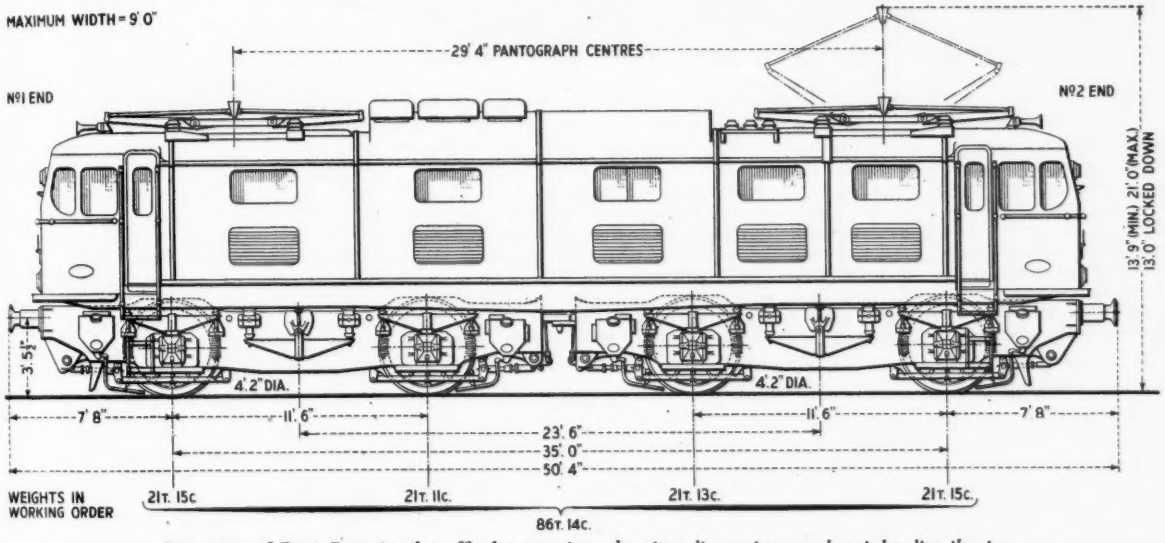


Diagram of Bo+Bo mixed-traffic locomotive, showing dimensions and weight distribution

* Parts 1 and 2 appeared in our issues of February 8 and 15

common pin. The brake shaft and cylinder supports form part of this fabrication. This unit is also welded to the main frame. The buffing and tractive forces are thus transmitted entirely through the bogies and articulation joint.

At the centre of each bogie, a steel casting carrying the traction motor nose suspension brackets and the bogie centre control gear, is riveted to main frames. Inside this casting are situated the emergency, inshot, and two timing reservoirs. The three latter reservoirs and emergency valve are in one unit. The plain bearing axleboxes have manganese steel liners welded to thrust faces. The hornblocks are cast steel and are riveted to main frames. These hornblocks are also fitted with manganese steel liners; the liners are welded to detachable steel plates bolted to hornblocks. When the initial high spots have been worn down on faces, the hornblock liners will be shimmed up. An almost indefinite life can therefore be expected from this method of construction.

The axlebox bearings are arranged for withdrawal without lifting the locomotive; they can be removed by jacking up the axlebox and withdrawing the packing plate. Axlebox faces are continuously lubricated from oil boxes, and axle bearings are lubricated by Armstrong pads only.

The traction motors are axle-borne on suspension bearings and drive through single reduction straight spur gears. The gear ratio is 70:17 which is 4·12:1. A resilient gearwheel is used for final drive. The carrying springs are 4 ft. span with eighteen 5 in. × ½ in. plates, and have a deflection of 0·24 in. per ton. Auxiliary helical springs, with a deflection of 0·2 in. per ton are fitted, giving a total deflection of 0·34 in. per ton load.

Springing of Body

The body and understructure are spring-borne at four points on each bogie. A spring, 4 ft. long, with fifteen 5 in. × ½ in. plates and a deflection of 0·21 in. per ton is pivoted on a bracket at centre of bogie outside the frames. At each end of the suspension spring, a piston in a suitable cast-steel guide rests on a bolt which is adjustable for height. The top of the piston is arranged to take a semi-spherical bronze bearing pad which registers with a steel bearing plate on upperstructure. This compensated method of supporting the upperstructure gives the minimum body deflection for a given lift of any wheel.

A cast-steel bogie centre is bolted to the underside of upperstructure at each bogie centre. This centre fits into a spherical housing, in which it is free to move up and down; the spherical housing can turn with a universal movement in a containing block. The whole assembly is contained in a casting sliding in guides transversely under the restraint of controlling springs fitted with an initial load of three tons and ultimate load of six tons. The containing block with spherical housing on No. 2 end bogie is free to move ½ in. longitudinally, in sliding casting, to take care of the foreshortening of bogie centres on a curve. The 1½ in. side play of bogie centre is not required to enable the locomotive to take curves, but is provided to fit the control springs with suitable loadings. All working parts of this gear are continuously lubricated from oil-boxes in the body.

Each axle is fitted with a mechanically independent set of clasp brake gear. A vertical Westinghouse brake cylinder, with brake-shaft, is mounted on each end fabrication of the bogie. A cross-stretcher, fitted with equalisers at each end, is connected to the brake shaft arm by a Westinghouse slack adjuster. Brake levers each side of the wheel are connected to top and bottom pins of equalisers respectively. The slack adjusters are used to ensure that the brake gear operates at a constant piston stroke; this is essential to obtain the correct equalisation pressure between brake cylinder and inshot and emergency reservoir. The self-adjusting feature of the slack adjusters is incidental, but is a great advantage in eliminating manual adjustment of brake gear. A sandbox is fitted at each corner of the bogies; the sanding is operated by a foot-pedal in each cab, each box thus sanding two wheels each side in either direction.

Understructure

The understructure is built with side-frame plates ¾ in. thick. A structure fabricated from flanged plates and channel sections carries the cast-steel bogie centre and is riveted in position in main frames. A stiff double cross-member is riveted to main frames at the centre of the locomotive. Between these are tee-sections all riveted to main frames. A $\frac{7}{32}$-in. footplate covers the whole floor; on top of it is mounted longitudinally a backbone which takes the weight of all auxiliaries. Carlines riveted to main frames of understructure take the curved body sides and roof. The whole of the roof is detachable in five sections between end cabs.

The locomotives have at each end a driving cab opening on to a machinery compartment; these are connected by a side corridor which, in turn, gives access to the resistance high-tension and boiler compartments. The resistance and high-tension compartments are fitted with sliding doors mechanically and electrically interlocked by reverser key from the master controller. The boiler compartment end is open to the corridor and is protected from it by a handrail.

The driver's cab has at each side an inward opening door placed behind the driver's seat, which is protected by a draught screen. At the front end of the cab is a full width desk on which are arranged all driving controls and equipment. Operated by the driver's left hand are the Westinghouse straight air brake valve, vacuum brake valve, horn button, vacuum release valve, and weight transfer switch. Facing the driver on an instrument panel and indirectly illuminated at night are voltmeters, ammeters, Westinghouse duplex air and vacuum pressure gauges, brake cylinder pressure gauge, and indicator lights. Operated by his right hand are the master controller, switches for auxiliaries and marker light switches. To the right again is the handbrake wheel, which is simply a parking brake.

The driver's seat is adjustable for height and is spring-loaded to fold out of the way when the driver stands up. At the driver's feet is a deadman's pedal, and in front of it a foot-operated standing switch. The left-hand front window is electrically heated for de-misting and is fitted with a power-operated window wiper. A hand-operated window wiper is fitted to right-hand front window. A self-locking drop window is fitted at each cab side. The cab roof is sprayed inside with an asbestos lining for heat insulation and sound proofing.

No. 1 end machinery compartment accommodates a motor-generator set which also drives the fan for traction-motor cooling, electrically driven Westinghouse vacuum exhauster, and air compressor, also battery box, low-tension panel cupboard and one main reservoir. The frames which carry the resistances are built integrally with the upperstructure and body. Resistances are cooled by natural air flow upwards through expanded metal protected holes in the floor and hoods in the roof. The centre hood can be easily detached to enable the individual resistances to be lifted out through the roof. In the high-tension compartment the frames are bolted into position. This enables all switchgear to be erected, wired, and piped in position on the shop floor, then erected as a complete unit.

Train Heating

The electrically heated boiler and tank for train heating are assembled as a unit. The tank is arranged for filling from either side of the locomotive at platform level. An electrically driven pump, automatically controlled by water level, feeds water from tank to boiler. A low water level device and pressure-operated switches take care of all working conditions. The boiler evaporates 1,000 lb. of water an hour and the tank capacity is about 240 gal. On locomotives which are not fitted with heating boilers, a cast-iron weight is used to balance the locomotive.

No. 2 end machinery compartment accommodates a motor-generator set driving a fan for cooling No. 2 bogie traction motors, and boiler feed pump. The remaining space in this compartment is absorbed by Westinghouse reservoirs and equipment.

The locomotive was designed (*a*) for one-man operation with deadman's feature; (*b*) to work express passenger and goods trains, all vacuum brake and close-coupled; and (*c*) to work unbraked loose-coupled freight trains. These con-

ditions call for a brake equipment capable of bringing all these different types of trains safely to a standstill from speed, without the sensitive control of an engine driver.

Braking System

A Westinghouse vacuum-controlled straight air brake with independent locomotive brake was developed for these reasons. The equipment consists of a system of air brakes and controls for vacuum brakes, suitably inter-connected, by which compressed air is used for operating the brakes on the locomotive and vacuum for operating the train brakes. Both systems have automatic action for deadman's emergency or break-away. The locomotive brake may be operated separately or synchronised with the train brake. A Westinghouse air compressor maintains the supply of compressed air in the main reservoirs from which connections are taken to the various operating reservoirs.

The operation of the compressor is controlled by a governor which cuts in when main reservoir pressure falls to 85 lb. per sq. in., and cuts out when 100 lb. per sq. in. is reached. Air enters the compressor through a suction strainer and is delivered to main reservoirs through suitable cooling pipes. Air from the main reservoir passes through a reducing valve set at 70 lb. per sq. in., into the brake-operating reservoir. This reservoir is used to feed the vacuum-air proportional application valve, the deadman's device, the regenerative brake failure apparatus and, *via* the straight air driver's brake valve, the automatic brake pipe.

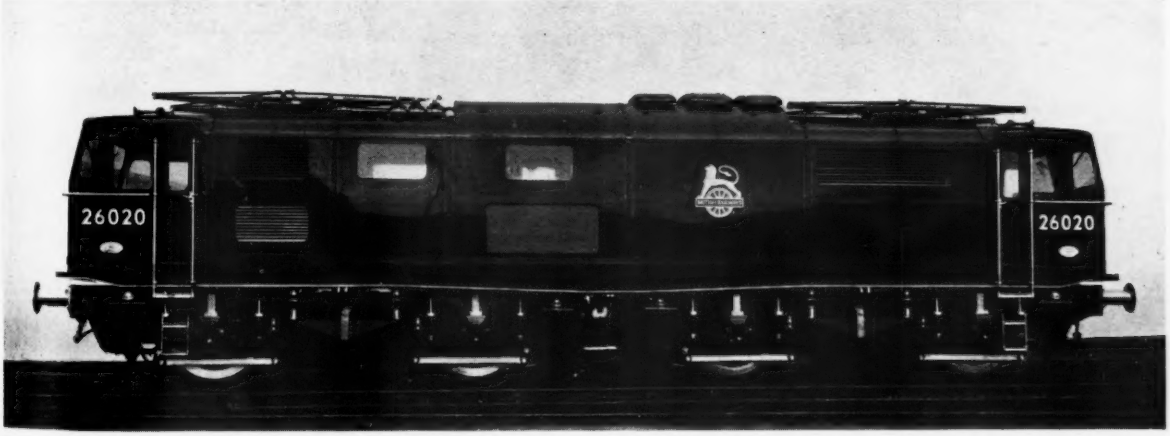
Air from the main reservoir, passing through a further reducing valve unit, set to 70 lb. per sq. in. feeds the control reservoir which provides air for the operation of the electro-pneumatic contactors in the high-tension compartment and for the pantograph. Air direct from the main reservoir pipe is used for operating pneuphonic horns, pneumatic window wipers, sanding equipment, and, *via* the straight air driver's brake valve, the straight air brake on the locomotive.

Bo+Bo locomotive hauling coal train on Oxspring Viaduct

The straight air driver's brake valve is of the self-lapping type—the pressure maintained in the brake cylinder is at all times proportionate to the movement of the brake valve handle. This valve is used to control the independent brake on the locomotive when hauling an unbraked train, when shunting, or when the locomotive is running alone. Air passes from the upper structure to the bogies through flexible hoses, and protection is provided against complete loss of main reservoir pressure should one of these hoses fail, by the provision of chokes which limit the possible loss of air through broken hoses. In any event the automatic brake remains available.

The vacuum driver's brake valve provides means whereby air may be admitted to the vacuum train pipe when a vacuum brake application is required. The main valve is of the rotary type and the valve spindle carries a contact spider which operates with contact fingers fastened to an insulating base within the body. When the driver's brake valve handle is moved to the application position, a circuit is closed which energises an electro-magnetic exhauster cut-out valve isolating the exhauster from train pipe, thus preventing the exhauster from pulling against brake valve. The brake valve handle is provided with a trigger-operated switch which, in conjunction

(*Continued on page* 211)



One of the mixed-traffic Bo+Bo electric locomotives with Metrovick electrical equipment, used for freight haulage between Wath and Dunford Bridge

Improved Multiple-Unit Trains for the New York Central

Flexible transmission in motor bogies of new trains with all axles power-driven

NEW trains of multiple-unit stock composed entirely of driving motor coaches, with all axles motored, have been placed in service by the New York Central System. The trains are operating on the suburban lines between Harmon, White Plains, and Grand Central Terminal, which are electrified at 600 volts d.c. with third rail.

Driving compartments are provided at diagonally opposite corners at the ends of every vehicle, so that the maximum flexibility is possible in the composition of trains. Formations vary from two to 15 coaches. The 100 coaches of this new series were built by the St. Louis Car Company, and have General Electric control and motive power equipment.

Fully Spring-Borne Motors

A feature still unusual in suburban electric stock is the use of fully spring-borne motors, with flexible couplings to the independently mounted gearcases. The coupling consists of an internally toothed sleeve enclosing a coupling pinion with external teeth formed to permit free swivelling in any direction relative to the sleeve, through an angle sufficient to accommodate any misalignment that may occur during running.

The gearcase is carried on the axle by roller bearings at one end and is supported from the bogie frame at the other end by a Ranger with a resilient rubber mounting. Two roller bearings in the gearcase carry the pinion shaft. Gears and bearings are oil lubricated. The flexible coupling between the gearcase pinion shaft and the motor armature shaft is lubricated with grease.

A complete motor and gearcase equipment weighs slightly under 2,400 lb. The motors, which are self-ventilated, have a 1-hr. rating of 100 h.p., the policy behind the design of this stock being to employ a large number of relatively small and light power units in the interests of good acceleration and freedom from wheelspin on greasy rails. With two motors in each bogie of all vehicles, the trains go further in the distribution of motive power than the latest London Transport surface line cars, in which a 110-h.p. motor (1-hr. rating) drives one axle of each bogie.

The motors operate at 300 V., the two in a bogie being connected permanently in series. They are controlled by an electro-pneumatic camshaft which rotates in one direction for the nine series notches and then, after transition, reverses for the nine full-field notches in series-parallel. An accelerating relay controls the operation of the camshaft and introduces the first weak-field step after the last series-parallel notch has been reached. A separate weak-field relay then brings in the second and final step of field reduction. Both are obtained by means of diverter resistances in series with inductive shunts.

The master controllers have off, shunting, series, series-parallel, and weak-field positions, the two stages of field-reduction following automatically when the handle is moved to the last-named position. If during acceleration the master controller is moved back to a preceding position, the movement of the camshaft is arrested at whichever notch it has reached. The 20 notches in this equipment compare with ten in the older stock.

In its principle of returning to its starting position on the final notch, the camshaft is similar to those of the equipments fitted to London Transport tube and surface line trains since 1938.

Two line contactors in series break the main power circuits in the event of an overload or supply failure. A high-speed relay operates if the line voltage falls below a certain value, and returns the camshaft to the " off " posi-

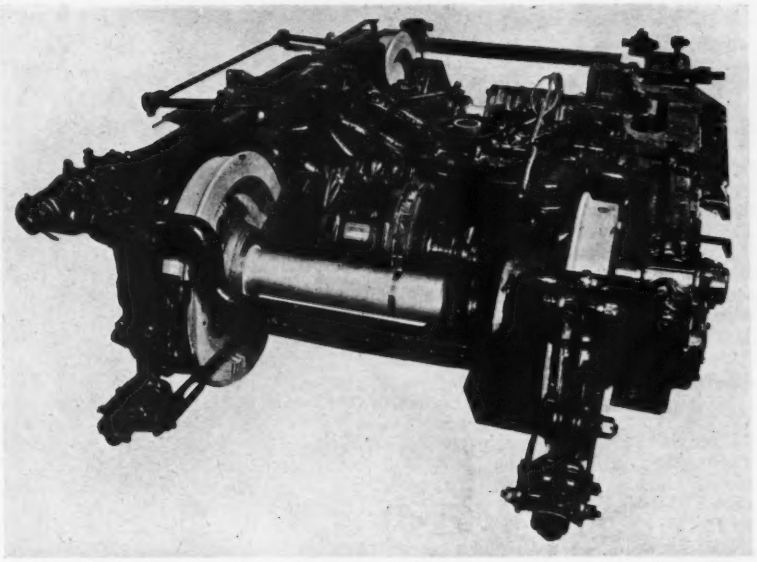
Train of new multiple-unit cars running in suburban services on the New York Central System

tion, so that when the power is restored the motors cannot be reconnected to the line without all resistance being in circuit. Circuit-breakers are used at several points in the control and lighting circuits and for main power switching.

The control equipment is set for an average rate of acceleration of 1·5 m.p.h. per sec., and the balancing speed of a five-car train on level track would be 70 m.p.h., but in practice the maximum permitted in the New York Central electrified suburban territory is 60 m.p.h.

A main-line standard of comfort has been aimed at in equipping the interiors of the new coaches, which have air-conditioning and fluorescent lighting. Each vehicle will seat 130 passengers. The bodies are of lightweight, welded construction, using high-tensile, low-alloy steel.

The overall length is 85 ft. and the bogie wheelbase 8 ft. The two-axle bogies have roller bearing axleboxes and 3-ft. dia. wheels. A coach fully equipped, but without passengers, weighs about 66 tons.



Motor bogie for New York Central multiple-unit cars, showing independent mounting of motors and gearcases, with drive through flexible couplings

First British Main-Line Electrification—3

(*Concluded from page* 209)

with the fingers, is so arranged that when the handle is in the release position and the trigger depressed, the exhauster is speeded up to a rapid release speed. When the trigger is released the exhauster returns to maintaining speed.

The driver's brake valve has a connection for a pipe to the vacuum-air proportional valve, which applies the locomotive air brake when a vacuum application is made on the train. This connection is in communication with the vacuum train pipe by a port in the rotary valve so that when the locomotive is in service with a vacuum-braked train the connection is restricted. Thus, in the event of an application of the train brakes by the guard or by any emergency such as a break-away, operation of the proportional valve is delayed.

The slow application of the brake force on the locomotive reduces the risk of heavy shocks due to the train running in on the locomotive and, in a break-away, enables the front part of train to run ahead of the broken portion. When, however, one of the vacuum driver's brake valves is moved to either the "release" or "brake on" position, the ports in the rotary valve allow the proportional valve to give locomotive brake applications or releases, suitably timed with respect to the normal vacuum brake applications on the train and under the control of the driver.

A combined strainer, snifter and check valve is fitted between exhauster and train pipe; the snifter valve opens against a spring to admit air to the train pipe should the vacuum in it exceed 21 in. The check valve prevents a back flow of air into the train pipe should the exhauster be shut down.

If the deadman's pedal in each cab is released, a deadman's application is initiated after a delay of six sec. The operation is in the following sequence. The automatic pipe is normally maintained at 70 lb. per sq. in., *via* the driver's brake valve, from the brake-operating reservoir. Air from the automatic pipe passes, *via* bogie hose connections to a combined automatic valve and three-chamber reservoir and emergency reservoir on each bogie. Should this automatic pipe be vented to atmosphere, either by operation of the deadman's device which allows an emergency application valve to open, the placing of driver's brake valve handle in emergency position, or the failure of a bogie hose connection, the automatic valve begins to operate.

The three-chamber reservoir contains an inshot reservoir and two timing reservoirs, and the first action of the valve is to allow air from inshot reservoir to pass to the brake cylinders with which it equalises at 14 lb. per sq. in. This retards the locomotive, and the timing reservoirs then provide suitable delay during which the wagons of a loose-coupled train may bunch up on the locomotive. After this delay, the valve allows air from the emergency reservoir to feed to the brake cylinders, slowly building up the brake cylinder pressure to a maximum of 50 lb. per sq. in., and bringing the locomotive and train to a standstill.

An air-operated vacuum emergency valve, normally held close by air from the automatic pipe, is fitted to the vacuum train pipe. Venting of the automatic pipe causes this valve to admit atmospheric air to the train pipe applying the vacuum brake on train. A timing reservoir and two-way cock enable this application to be timed suitably for passenger or freight trains. A control governor is fitted to the automatic pipe and, when a deadman's application is made, power is cut off from the traction motors and sanding is applied automatically. When the deadman's pedal is again depressed, after a slight delay, the emergency application valve is closed; the automatic pipe can then recharge with the three-chamber and emergency reservoirs and the brake is released.

As already stated, the locomotives are equipped with regenerative braking, and means are provided whereby, should this system of braking fail, an immediate equivalent air brake application is made on the locomotive. A supply of air is piped from the control reservoir to an "on" type valve which is mechanically depressed by an arm on the motor-generator drum switch when it is in "Regen" position. Thus, when "Regen" connections have been set up, air can pass through the "on" valve to an "off" magnet valve which is energised "closed" from the "Regen" drum of the master controller in "Regen" position.

The circuit of the "off" magnet valve is completed through the over-voltage and overload relay contacts, so that, if either of these relays trips, the valve is de-energised "open" and air can pass through to a limiting valve set to 35 lb. per sq. in., and thence to a relay valve, fed from brake-operating reservoir, which gives a corresponding pressure in the brake cylinders.

(*To be continued*)

Tool Drives with High-Frequency Motors

Making use of the advantages of squirrel-cage construction when high rotational speeds are required

IN some types of portable electric tools a high rotational speed is required from the driving motor in order to develop sufficient power within the necessary limits of size and weight. The use of induction motors for such purposes is attractive, because it eliminates brushgear and the possibility of armature failures arising from severe service, but the maximum speed of 3,000 r.p.m. obtainable on normal 50-cycle mains is too low for many purposes.

Where portable tools are used in considerable numbers, it is often the practice to provide a special high-frequency supply for their operation. On 200 cycles, which is a usual value for such work, a two-pole induction motor runs at 12,000 r.p.m. (neglecting slip) and gives four times the power of a corresponding 50-cycle motor. Its advantages over the series commutator type of machine are not confined to simple and robust construction, for it also has a more constant speed characteristic at varying loads. Excessive overload causes the motor to stop, thus warning the operator to suspend work, whereas a series motor may continue to run at much below its normal speed, with the risk of burning out its armature winding.

Induction Type Frequency Changers

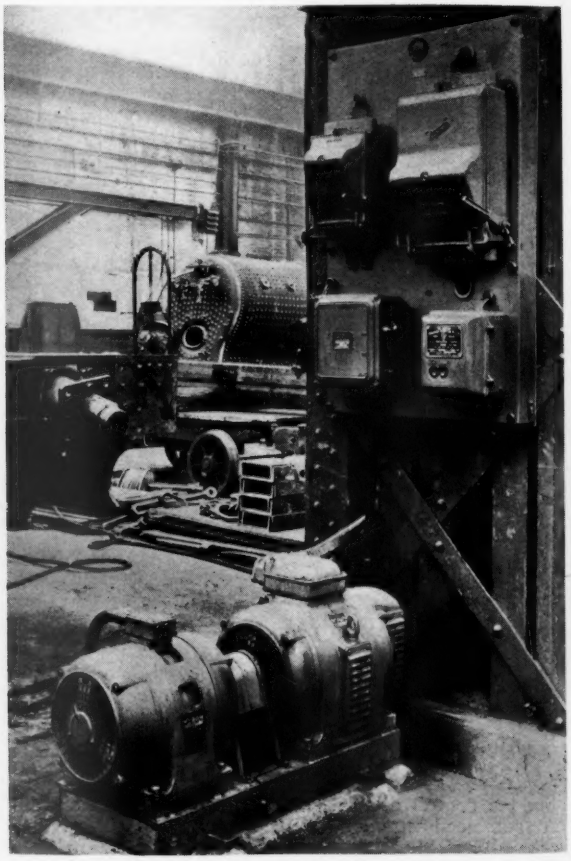
Frequency changers for frequencies up to 400 cycles are usually of the induction type, and consist of what is virtually an induction motor with its stator excited from the ordinary 50-cycle three-phase mains, but its rotor being driven in the opposite direction to that in which it would normally rotate. The high-frequency output is taken through slip rings from the rotor winding. One illustration shows a B.T.H. 10-kW. direct-coupled set, with its control panel, installed for supplying high-frequency tools at the works of the North British Locomotive Co. Ltd. The control panel comprises an isolator, motor starter, frequency-changer excitation switch, and H.F. mains switch, all of the iron-clad air-break type.

In some installations two frequency changers, with their driving motors, are provided, each normally supplying a separate circuit. Changeover switches enable such machines to feed either or both circuits if necessary.

In sets of lower rating the driving motor may be overhung on the frame of the frequency-changer so that only two bearings are required and there is no coupling. Single-unit machines without a separate driving motor are made in capacities up to 6 kW., and may be built into larger machine tools with a high-frequency motor drive so as to make them self-contained, and capable of being operated from any 50-cycle three-phase supply point. Belt drive between motor and frequency-changer may be used when a choice of output frequencies is desired, this being obtainable by changing the pulley sizes.

Some of the tools operated from the 10-kW. frequency-changer already mentioned are shown in use in another illustration. These are Hicycle staybolt tappers made by the Consolidated Pneu-

Tapping holes for staybolts at the works of the North British Locomotive Co. Ltd., where the Hicycle tools used in this operation are carried in a special rig



A 10-kW. B.T.H. frequency-changer and control panel installed for operating tools with high-frequency induction motors at the works of the North British Locomotive Co. Ltd.

Hicycle drill powered by a high-frequency motor in use on wagon repair work

matic Tool Co. Ltd., and are shown incorporated in a special rig designed for easy manipulation. In this tool the opening of the power switch applies a brake to the spindle, so that it is pulled up dead if the operator switches off because of a tendency for the tap to stick in the hole. The tool suspensions shown are telescopic balancers with a light and sensitive adjustment enabling a tapper to be set immediately at any desired height. Staybolt tappers may be used also for driving staybolts, with economy in time and labour.

A companion Hicycle tool to the tapper, likewise used in the North British installation illustrated, is a staybolt drill with air-feed cylinder. This feature leaves the operator's hands free for guiding the tool and relieves him of adjustment of the feedscrew. In many Hicycle tools the rotor is of jointless construction to exploit to the fullest possible extent the mechanical simplicity and strength of the squirrel-cage machine. The windings are of a special alloy having the electrical characteristics of copper and are cast solid with the core. Certain machines have a copper strip winding laid in slots which serve also as ventilating ducts.

Selection of Equipment

Some notes on the selection of equipment for high-frequency installations have been given in recent issues of *B.T.H. Activities* published by the British Thomson-Houston Co. Ltd., and from these the following table of common speeds, frequencies and applications has been compiled:—

Frequency (cycles)	Speed* (r.p.m.)	Voltage	Application
75	4,500	225	Woodworking (machine moulders)
100	6,000	300	Woodworking (machine moulders)
125	7,500	375	Woodworking (machine moulders)
150	9,000	125	Portable tools
200	12,000	127	Portable tools
300	18,000	105	Woodworking (routers)
400	24,000	140	Woodworking (routers)

* Full synchronous speed; may be 5 per cent. less in practice due to load and conversion.

It will be noticed that frequency-changers supplying portable tools are designed for a low output voltage to contribute to safety in handling. If higher speeds than 24,000 r.p.m. are required, other types of machines are used to generate the high frequencies. Considerable development is taking place in this direction, such as the design of inductor-type alternators for frequencies up to 2,000 cycles, and it is likely that high-frequency technique will be adopted on a growing scale wherever high and sustained rates of productivity are required from large numbers of tools.

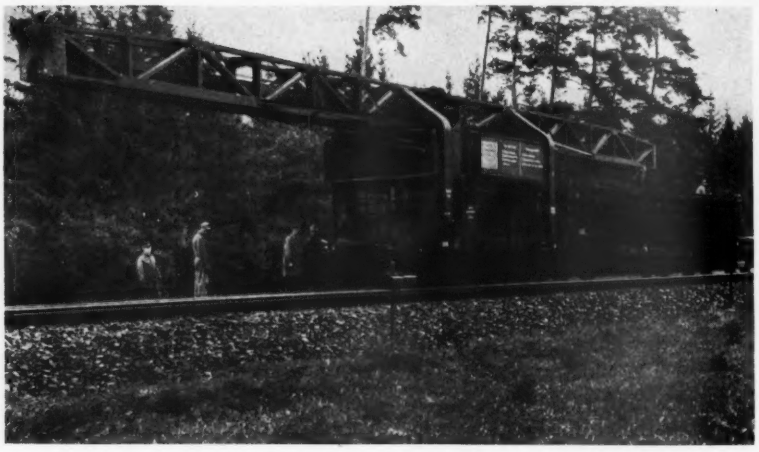
Royal Funeral Train

The train conveying the body of the late King George VI from Paddington to Windsor, on the Windsor branch near Slough

Photo] [*M. W. Earley*

Modern Relaying in Germany

Some 4½ miles of main line were relaid with all-welded track in 12 days



Niemag crane at work. It has just lifted a complete rail length of track from the left, carried it over its cab and unloaded it on to flat wagon on right

A 4½-mile section of the Munich-Rosenheim-Salzburg main line of the German Federal Railways has recently been relaid in 12 days as a continuous welded length without joints. To minimise the risk of rail buckling and increase the life of the permanent way, the new tracks were laid on pre-stressed concrete sleepers 7 ft. 6½ in. long, weighing 500 lb. By means of two slightly curved reinforcing bar ¼ in. in dia., a pre-stressing effect of 26 tons was imparted hydraulically so that all the dynamic forces could be safely absorbed.

A ribbed soleplate, screwed on to special-type hardwood plug dowels, guarantees a rigid connection between rail and sleeper. The life of such a reinforced concrete sleeper is estimated at 60 years, compared with some 35 years' life of an ordinary hardwood sleeper, thus compensating for the somewhat higher first cost.

Extensive Mechanisation

During the relaying, single-line working was in operation. To minimise the time of the engineer's possession, extensive mechanisation was used and some of the plant had to be specially designed. About two hundred men were engaged to work day and night shifts.

The old track consisted of 15-m. (49-ft.) rails with wooden sleepers. After removing the fishplates, rail lengths complete with sleepers, were lifted by means of a special Niemag crane, fitted with a travelling winch running on a through longitudinal truss cantilever extending horizontally fore and aft over the track. This is supported at the sides of the crane only, leaving a central space over the crane cab such that the entire rail length can be moved longitudinally above the crane and deposited on a flat wagon standing behind it. This flat wagon formed part of a whole train of such wagons on which a continuous transporter track was mounted.

When the crane had stacked four sections of the old track on the nearest wagon, the whole stack, moving on rollers fitted to the lowest section, was hauled to the farthest unloaded wagon of the train by a cable attached to a locomotive. In this way, it was possible to remove 100 15-m. rail lengths, or nearly a mile of track, a day, a speed seven times greater than hitherto achieved. The crane has a lifting capacity of 4·8 tons, and each 15-metre rail length has a weight of between 3½ and 4 tons.

After the removal of the old track, the ballast bed was first levelled by hand and subsequently compacted by four Vibromax diesel-operated vibrators delivering between 700 and 1,500 blows a min. The rails were then temporarily mounted as conveyor rails, one on each side and clear of the final track bed, and linked together. In this position, the rails carried a special machine which successively dumped and consolidated two 2-in. layers of fine-grain ballast on top of the old ballast.

Sleeper Laying

The laying of the concrete sleepers was also mechanised. A ballast train loaded with them was pushed forward to the end of the completed track, and the sleepers were slid forward from any wagon to the front wagon along the track extending the length of the train. For this purpose, each sleeper was temporarily fitted with two sliding shoes. At the front end, three sleepers were laid simultaneously by a special device, running on the guide-rails. In this way, the 46 sleepers required for a 30-m. length of rail, were laid in 15 min. Subsequently, the conveyor rails were dismantled and used to form the track itself, which was temporarily linked with fishplates so that the ballast train could proceed.

Finally, the rails, weighing 49 kg. per metre (99 lb. per yd.), were thermit pressure-welded together, the joints were filed and planed smooth and, after fettling, the track was fit for traffic at reasonable speed.

Sleeper-laying machine running on side conveyor

RAILWAY NEWS SECTION

PERSONAL

Mr. F. C. Garside has retired as Commissioner for Railways, New South Wales, and has been succeeded by Mr. K. A. Fraser, formerly Chief Civil Engineer, New South Wales Government Railways.

Mr. R. K. Innes, Chief Mechanical Engineer, Western Railway, India, who, as recorded in our February 1 issue, has retired, received his early training with the G.W.R. at Swindon Works, which he entered in 1915. Between 1917-19 he served with the Royal Naval Air Service. From 1920 to 1922 he was on a three-year residential course at Loughborough College studying mechanical and civil engineering and was awarded a diploma. He returned to Swindon to complete his training and in 1920 was awarded the Great Western Engineering Society Premium, and the Society's Medal in 1923. In 1923-24 he commanded the G.W.R. company of the Hants Fortress, Royal Engineers (Territorial Army). Mr. Innes joined the Bombay, Baroda & Central India Railway as Assistant Locomotive Superintendent in 1924 and later in the same year became Works Manager, Parel. Until 1939 he served mostly in workshops and in 1932 was B.B.C.I.R. observer to the Pope Enquiry Committee. In September, 1939, he was nominated by the Railway Board to serve on the staff of the Master-General of Ordnance as Chief Industrial Planning Officer, to organise surveys and the collation of capacities of the Indian railway workshops and civil industry for munitions production. On the creation of the Directorate-General of Munitions Production in 1940 and the advent of munitions demands on Indian workshops, Mr. Innes was appointed Assistant Director, Munitions Production, and was successively appointed Deputy Director, Civil Production; Director, Civil Production (General); and Director, Railway Demands, in 1944. On rejoining the B.B.C.I.R. he was appointed Deputy Locomotive & Carriage Superintendent (Broad Gauge). In 1948, the hitherto distinct broad and metre-gauge Locomotive & Carriage Departments were amalgamated and Mr. Innes became the first Chief Mechanical Engineer, with responsibility for the Parel, Dohad, and Ajmer workshops as well as running work. In 1932 he was appointed by the Government of Bombay as Chairman of the David Sassoon Reformatory, and the following year became a J.P., City of Bombay.

Mr. R. K. Innes

Chief Mechanical Engineer, Western Railway, India, who has retired

Elliott] [*Daily*

The late Mr. W. S. Graff-Baker

Chief Mechanical Engineer (Railways), L.P.T.B., and London Transport Executive, 1935-52

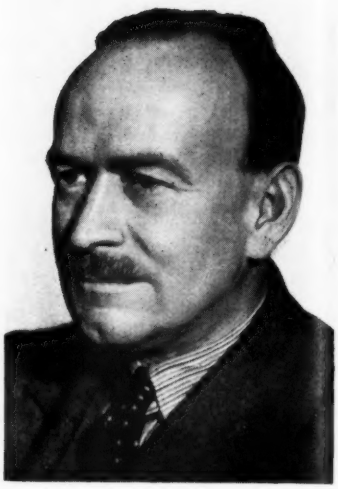
Mr. T. B. Welch, Chief Mechanical Engineer of the Nigerian Railway, is at present on leave in Great Britain.

We regret to record the death on February 16 of Mr. Warren Storey, Electrical Engineer, Coras Iompair Eireann, 1945-48, and since then, an engineering representative of J. Stone & Co. (Deptford) Ltd.

We regret to record the death on February 15 of Mr. W. S. Graff-Baker, B.Sc. (Eng.), A.C.G.I., M.I.Mech.E., M.I.Loco.E., M.Inst.T., and Member of the American Society of Mechanical Engineers, Chief Mechanical Engineer (Railways), London Transport Executive. He was born in November, 1889, and educated at Colet Court and St. Paul's schools, Cleobury Mortimer College and Johns Hopkins University, and at the City & Guilds (London) Central Technical College. He joined the service of the Metropolitan District Railway as a junior electrical fitter at the age of 20 and after spending some time in the workshops and drawing office of the Chief Mechanical Engineer's Department, and in the Traffic and Civil Engineer's Departments, he was appointed an Assistant to the Mechanical Engineer in 1912. A year later he was placed in charge of all lifts and escalators on the London Electric Railway and the Central London Railway, and after serving for a few months in the capacity of Personal Assistant to the Mechanical Engineer, he became Car Superintendent in 1921. In 1922 he was appointed an Officer of the Underground Group of companies, with the title of Assistant Mechanical Engineer, a position he continued to hold after the formation of the London Passenger Transport Board in 1933. In February, 1935, Mr. Graff-Baker became Chief Mechanical Engineer (Railways) to the Board, responsible for the design, construction, maintenance and over-

Mr. Sydney Cott
Appointed District Passenger Superintendent, Newcastle, North Eastern Region

The late Mr. E. T. Davies
Divisional Engineer, London, G.W.R., and District Engineer, Paddington, Western Region, 1945-52



The late Lt.-Colonel R. D. Walker
Manager & Chief Engineer, Kowloon-Canton Railway, British Section, 1934-39

haul of all London Transport railway rolling stock, lifts and escalators. In the earlier years of the war Mr. Graff-Baker was for a while seconded to the Ministry of Supply as Director of Tank Production. He was President of the Institution of Locomotive Engineers for 1944-45 and 1945-46, and was a Member of the Council. He was a Member of the Council of the Institute of Transport, 1937-40, and from 1945 to 1948 served on a number of the Institute's Committees. A funeral service was held at Golders Green Crematorium on Wednesday, February 20.

Mr. W. S. Graff-Baker—An Appreciation

Mr. V. A. M. Robertson writes:—

W. S. Graff-Baker was a friend of mine for 25 years of which we spent 16 years together as officers of the Underground Railways and London Transport. I therefore have personal and intimate knowledge of him as a friend and engineering colleague.

His premature and untimely death has been a great shock to his many friends and colleagues and has robbed the London Transport Executive of the valuable services of a railway mechanical engineer whose inventive genius played such an important part for many years in the rapid development of the railway rolling stock, escalators and lifts of London's Underground Railways.

Under his guidance and direction there have developed the Metadyne equipment and the underslung motors of Underground trains as well as the automatic high speed lifts and modern escalators.

He was optimistically fearless in his search for new methods of improving the comfort and efficiency of the rolling stock under his charge and he was happiest when deeply engaged in attempting to solve an electrical or mechanical problem on design which to most people would have caused dismay and a premature sense of defeat.

There have probably been better known Chief Mechanical Engineers on the railways of this country, but few have left behind them a greater contribution to the safe and comfortable travelling facilities of passengers on the Underground Railways of London.

Mr. Sydney Cott, A.M.Inst.T., Assistant District Passenger Superintendent, Euston, London Midland Region, who, as recorded in our February 15 issue, has been appointed District Passenger Superintendent, Newcastle, North Eastern Region, joined the Midland Railway in 1917. After special training he became a Personal Assistant to the Divisional Operating Superintendent at Crewe in 1934 and later at Preston. He transferred to Euston as Head Office Inspector in 1936 and was concerned with the modernisation of passenger stations and improving staff amenities. Three years later he was attached to the L.M.S.R. Vice-President's Office at Euston. He became Assistant District Controller at Kentish Town in 1944 and in 1945 was made Passenger Assistant to the District Goods & Passenger Manager, Derby. He went to Birmingham in 1948 as Assistant District Passenger Manager and in January, 1951, was transferred to London in a similar capacity.

We regret to record the death on February 14, at the age of 57, of Mr. E. T. Davies, M.C., M.I.C.E., District Engineer, Paddington, Western Region. He received his technical training at the University College of South Wales, Cardiff, and as an articled pupil to the Chief Engineer of the former Taff Vale Railway. In 1915 he joined the forces and in 1917, while serving with the 67th field company, Royal Engineers, in France and Belgium, received an immediate award of the Military Cross at Passchendaele, and a year later received a similar award of a Bar at Cambrai. He was demobilised with the rank of Captain and rejoined the Taff Vale Railway. Before the Grouping, Mr. Davies was employed chiefly on the design and erection of bridges and on his transfer to the G.W.R. was appointed to the Central Wales Division, where he was in charge of some of the largest construction works then in progress. He went to the London Division in 1925 as an Assistant; in 1926 was appointed Assistant Divisional Engineer at Gloucester; and in a similar capacity returned to the London Division in 1932. Two years later he was appointed Assistant in the Chief Engineer's Office, and in 1936 became General Assistant. In 1937 Mr. Davies took up the post of Divisional Engineer, Taunton, and in 1940 was appointed Principal Assistant to the Chief Engineer at Paddington. In 1945 he became Divisional Engineer, London, a position which was later redesignated District Engineer, Paddington. Mr. Davies assisted in the formation of the Supplementary Reserve, R.E. At one time he commanded No. 1 Railway Bridging Company, later 152nd (G.W.) Railway Construction Company, and was co-ordinating officer between the four Great Western companies and the War Office.

We regret to record the death on February 12, at the age of 76, of Mr. C. W. C. Hine, a former Director & Manager of the Railway Department, George Spencer, Moulton & Co., Ltd. He retired in 1949, after 57 years service with the company.

We regret to record the death on January 28, at the age of 59, of Lt.-Colonel R. D. Walker, M.C., O.B.E., M.I.C.E., Manager & Chief Engineer, Kowloon-Canton Railway, British Section, 1934-39. He was trained at the Royal College of Science and at the City & Guilds Central Technical College, South Kensington, where he took a post-graduate course in railway engineering, receiving the Diploma of the Imperial College. During the 1914-18 war he saw service with a field company, R.E., in France, Salonica and Egypt. From May, 1918, to May, 1920, he was with the Railway Operating Division, Egyptian Expeditionary Force, being O.C., R.O.D., from December, 1919, to May, 1920. In December, 1920, Mr. Walker was appointed an Assistant Engineer, Federated Malay States Railways, and subsequently became Maintenance Assistant, and Special Service Assistant to to Engineer for Way & Works. He was appointed General Manager & Chief Engineer, Kowloon-Canton Railway, British Section, in 1934 and held this position until the outbreak of the second world war, when he acted as Director of War Supplies in Hong Kong. During the Japanese invasion he was severely wounded and spent four and a half years in a military prisoner of war camp in Hong Kong. He returned to Britain in 1945.

British Transport Commission Statistics (Period No. 13)

Summary of the principal statistics for the four-week period ending December 30

STAFF

—	B.T.C. Head Office	British Railways	London Transport	British Road Services (Road Haulage)	Road Passenger (Provincial & Scottish)	Hotels & Catering	Ships & Marine	Inland Waterways	Docks, Harbours, Wharves	Railway Clearing House	Commercial Advertisement	Legal	Films	Total
Number ...	275	599,649	99,279	80,245	59,349	16,124	5,891	4,934	19,937	635	201	314	39	886,882
Inc. or dec.	− 2	+179	−115	−433	−85	−381	−73	+25	−76	−3	—	+2	−1	−963

BRITISH TRANSPORT COMMISSION TRAFFIC RECEIPTS

—	Four weeks (Period No. 13)		Aggregate for 52 weeks	
	1951	1950	1951	1950
	£000	£000	£000	£000
British Railways—				
Passengers	7,799	8,006	106,610	106,484
Parcels, etc., by passenger train	2,511	2,413	32,950	30,661
Merchandise	7,357	6,482	97,663	86,656
Minerals	2,990	2,462	36,625	32,472
Coal & coke	6,779	5,986	90,858	77,685
Livestock	124	130	1,530	1,869
	27,560	25,479	366,236	335,827
British Railways— C. & D. and other road services	808	685	10,533	9,550
Ships and Vessels	666	657	11,829	10,829
London Transport—				
Railways	1,224	1,212	16,045	14,666
Buses & coaches	2,531	2,234	33,664	30,741
Trams & trolleybuses	688	760	9,612	10,514
	4,443	4,206	59,321	55,921
British Road Services— Freight charges, etc.	5,682	4,793	77,398	62,473
Road Passenger Transport	3,000	2,579	43,192	38,088
Docks, Harbours & Wharves ...	1,173	889	14,093	11,768
Inland Waterways	142	112	1,807	1,586
Hotels & Catering	1,244	1,120	16,070	14,519
Total	44,718	40,520	600,479	540,561

LONDON TRANSPORT

—	Passenger journeys	Inc. or dec. per cent. over 1950	Car miles	Inc. or dec. per cent. over 1950
	000		000	
Railways	46,751	− 0·7	16,519	− 2·8
Buses & coaches	219,719	+12·3	24,965	+ 7·0
Trams & trolleybuses	68,281	− 9·7	6,617	−14·3
Total	334,751	+ 5·2	48,101	+ 0·1

INLAND WATERWAYS

Tonnage of Traffic and ton miles

—	Tonnage	Inc. or dec. per cent. over 1950	Ton miles	Inc. or dec. per cent. over 1950
	000		000	
Coal, coke, patent fuel & peat	434	+ 7·8	6,371	+20·1
Liquids in bulk	153	+ 7·2	3,570	− 3·6
General merchandise	337	−12·0	5,249	+18·6
Total	924	− 0·5	15,190	+13·1

BRITISH RAILWAYS

Rolling Stock Position

—	Operating stock	Number under repair	Available operating stock	Serviceable stock in 1950
Locomotives	19,249	3,002	15,847	15,974
Coaching vehicles	57,893	4,705	53,188	53,095
Freight wagons...	1,109,233	69,987	1,039,246	1,031,007

BRITISH RAILWAYS

Passenger Journeys (Month of November, 1951)

Full fares	Monthly returns	Excursions, cheap day, etc.	Other descriptions	Workmen	Season tickets	Total	Inc. or dec. per cent. over 1950
5,560,000	8,144,000	17,755,000	3,517,000	19,053,000	19,071,000	73,100,000	+ 2·6

BRITISH RAILWAYS

Freight Tonnage Originating and Estimated Ton-Miles (period No. 13)

—	Minerals	Merchandise	Coal & coke	Livestock	Total	Inc. or dec. per cent. over 1950
	000	000	000	000	000	
Tons originating ...	4,700	3,919	12,424	59	21,102	+2·7
Ton-miles	392,087	520,266*	769,889	—	1,682,242	+6·8

* Includes livestock

BRITISH RAILWAYS (Period No. 13)

—	Total steam coaching train-miles	Total electric coaching train-miles	Total freight train-miles	Freight train-miles per train engine-hour	Net ton-miles per total engine-hour	Locomotive coal consumption	
						Total tons	Lb. per engine-mile
1951	13,415,000	3,560,000	10,292,000	7·9	584	1,037,000	65·6
1950	14,184,000	3,585,000	9,984,000	7·4	529	1,078,000	67·0

The Passing of King George VI

The body of the late King George VI was brought from Sandringham to London by rail on Monday, February 11. The special train was made up of nine vehicles, all of which were in the varnished teak livery of the former L.N.E.R., except the hearse-coach, which was painted black with a white roof. It was hauled from Wolferton (the station for Sandringham) to Kings Lynn by the "Sandringham" class 4-6-0 locomotive No. 61617, *Ford Castle*. After reversal at Kings Lynn, the train continued its journey to Kings Cross behind the first of the new class "7" Pacifics, No. 70000, *Britannia*. The departure time from Wolferton was 12.5 p.m. and Kings Cross was reached at 2.45 p.m. The body of the King was then taken to Westminster Hall to lie in state for three days, before its final journey to St. George's Chapel, Windsor.

A trial run of the funeral train from Paddington to Windsor was made on Tuesday, February 12, behind the Western Region "Castle" class locomotive No. 7013, *Bristol Castle* in charge of Driver Albert Potter. The train gained time slightly on the 21½-mile journey, and reached Windsor two min. early.

On Friday, February 15, the funeral procession started from Westminster Hall at 9.30 a.m., and made its way across London to Paddington. The head of the procession reached the station at 11.20, slightly ahead of time, and about 25 min. later the gun carriage bearing the coffin drew up on the roadway between platforms 8 and 9, where a guard of honour had been formed. Paddington Station was draped in purple and black, and the coat-of-arms of the former G.W.R. above the entrance had been freshly painted. At the buffer-stop ends of platforms 9 and 10 had been erected stands for onlookers. Only they and *bona fide* travellers were admitted to the station, after 10 a.m. A number of

The funeral train drawn up at platform 8 at Paddington Station

The Royal coffin being carried into the funeral train

trains was suspended or altered in working. The Queen's carriage was halted opposite the rear end of the hearse-coach of the train, which was waiting at No. 8 platform. The Queen, the Queen Mother, Princess Margaret, and the Princess Royal then alighted and stood together on the carpeted platform while the coffin was carried into the hearse-coach, which was marshalled third from the engine, in front of the coach occupied by the Queens and the Princesses. The Royal Dukes travelled in the fifth coach of the train.

Special trains were run to Windsor in advance of the funeral train, and the special for mourners in the procession started from No. 9 platform at 12.20 p.m., hauled by 4-6-0 engine No. 7004, *Eastnor Castle*. The funeral train left at 12.35 p.m., hauled by a "Castle" class locomotive named ***Windsor Castle***, in charge of Driver Potter and Fireman H. T. Bliss, both of Old Oak Common Depot. Draped Royal coats-of-arms were displayed on each side of the smokebox. The original locomotive No. 4082 *Windsor Castle*, built in 1924, which hauled the funeral train of King George V in 1936, was not available. Its nameplates and numberplates were therefore transferred to No. 7013, *Bristol Castle*, built in 1948. A brass plate on the cab of No. 4082 commemorates the occasion in 1924 when King George V drove the engine at Swindon. It is understood that the substitution of the nameplates and numberplates will be permanent.

The train was the same as that used for the journey from Wolferton to London, but with one coach less. Windsor Central Station, which was also draped in purple and black, was reached punctually at 1.10 p.m. Mr. John Elliot, Chairman, and Mr. V. M. Barrington-Ward, Member, the Railway Executive, and Mr. K. W. C. Grand, Chief Regional Officer, and Mr. Gilbert Matthews, Operating Superintendent, Western Region, travelled with the funeral train.

Thus, for the fourth time in just over half a century, the Great Western Railway and its successor have been called on to carry to its last resting place the body of a Sovereign. It was on February 2, 1901, that the funeral train of Queen Victoria, the first British monarch to travel by rail, was run from Paddington to Windsor. Some nine years later, on May 20, 1910, similar arrangements were made for the funeral of King Edward VII. The third occasion was on January 28, 1936, when the body of King George V was conveyed to St. George's Chapel for burial after having been conveyed from Sandringham to London by rail. All three funeral trains also started from No. 8 platform at Paddington.

Institute of Transport Visit to Netherlands

The reduction of the tourist allowance to £25 has made it necessary to review the arrangements for the Institute of Transport visit to the Netherlands in May, previous reference to which was made in our February 3 issue. It has been found possible to proceed with the arrangements as a result of enquiries made in Amsterdam on behalf of the Institute by a representative from London and the revised programme will be as follows:—

May 19.—London to Amsterdam.

May 20.—Morning free. Afternoon sightseeing excursion, including journey on the canals.

May 21.—Visit by rail to oilfields at Schoenebeek.

May 22.—Morning visit to airport at Schiphol. Afternoon visit to Marken and Volendam, followed by dinner in the Hall of Knights at Ijmuiden Castle, by invitation of the B.P. Petroleum Company.

May 23.—Visit by motorcoach to Aalsmeer (flower market) and The Hague, travelling part of the way along the Oogstgeest speedway.

May 24.—Morning free. Afternoon with the Netherlands Railways, followed by dinner, by invitation of the President of the Netherlands Railways.

May 25.—Visit by motorcoach and steamer to the Zuyder Zee works.

May 26.—Visit by rail to Port of Rotterdam, including the Pornis oil refinery. Lunch by invitation of the Bataafsche Petroleum Maatschappij.

May 27.—Amsterdam to London.

The hotel arrangements originally planned have been revised. The Institute will arrange the allocation of hotels but it will be in order for any member to make his own arrangements for accommodation. The estimated cost of hotel accommodation, meals, tips, and luggage transfers at Amsterdam, is from £16 to £20 according to hotel. Usually, the visitors will take either lunch, or dinner, at their hotels and this has been allowed for in the estimate.

Retired Railway Officers' Society

The 51st Annual Meeting of the Society was held at the Great Eastern Hotel, Liverpool Street, on February 12, when the Report and Accounts for 1951 were submitted. The report stated that during the past year 14 new members were elected but eight of the older members passed away and there were three resignations leaving a nett increase of three over the number at the end of 1950. During the last five years the membership has increased by one-third, the number of members now totalling 178 (Life 13, Honorary three and Ordinary 162). The monthly meetings of the Society were well attended with an average attendance of 39 and some interesting talks were given by railway officials and others. The social activities, consisting of the autumn luncheon last November when the President of the Board of Trade, Mr. Peter Thorneycroft, M.P., was the principal guest, the ladies' tea and musical entertainment and the annual excursion—this time to Eastbourne—were even more enjoyable than formerly.

In the unavoidable absence of the Treasurer, the Auditor, Mr. J. H. Laundy, presented the statement of accounts, which showed a cash balance of £86 3s. 7d. as against £71 19s. the previous year.

The choice of the special sub-committee appointed to nominate a President for the ensuing year fell upon Mr. W. M. Perts, formerly Commercial Superintendent of the Southern Railway, who was elected with acclamation. Unfortunately Mr. Perts was run over by a motor-cycle a few days previously and taken to hospital but it is expected that he will soon recover from his injuries. The retiring Treasurer, Mr. J. W. Lovejoy, and the Hon. Secretary, Mr. F. E. Cox, who were willing to serve again, were unanimously re-elected and Messrs. J. H. Laundy and G. Morton were appointed Joint Auditors. Mr. A. L. Castleman proposed a hearty vote of thanks to the retiring President, Major A. S. Mills, and to the officers for their valuable services during the past year.

Staff & Labour Matters

Engineering Apprentices' Claim

The Confederation of Shipbuilding & Engineering Unions has presented to the Engineering & Allied Employers' National Federation a claim for an increase of £1 a week on the basic rates of all engineering apprentices, boys and youths. About 100,000 are affected by the claim in federated firms alone. Present time rates, calculated as a percentage of the fitter's rate, range from 29s. 0¼d. a week at 15 to 80s. 7½d. at 20.

So far as railway workshop staff is concerned, proposals for improving the rates of pay of youths and apprentices were made by the Railway Executive at the meeting of the Railway Shopmen's National Council last December, when the offer to increase the rates of pay of adult male workshop staff by 8 per cent. was made. This offer was rejected by the Confederation and the claim, including that of youths and apprentices, will be considered by the Industrial Court next month.

Increase for Gas Employees

An increase in pay of £20 a year has been conceded with effect from December 30 last to nearly 10,000 gas industry employees. The men concerned include storekeepers, drivers, and occasional collectors.

Proposed Increase for Haulage Workers

The Road Haulage Wages Council has circulated proposals in document RH(39) for improved wages and conditions for haulage workers employed on "A" and "B" licence vehicles.

Grades 1 and 2 rates, it is suggested, would be 132s. and 128s. per week respectively, and a new category for vehicles of over 15 tons laden weight has been introduced, the maximum for which will be 137s. a week.

Night work payment would be 6d. an hour and subsistence payment 12s. 6d. Overtime for six-day workers would be payable on Saturday for work performed after 12.30 p.m. instead of 2.0 p.m. at present. Time-and-a-half payment would be made for overtime after the first six hours of overtime in any week (exclusive of Sunday) instead of after eight hours at present.

BRUSH ELECTRICAL ENGINEERING CO. LTD.—The Brush Electrical Engineering Co. Ltd., which holds all the issued ordinary capital of the National Gas & Oil Engine Co. Ltd., is offering an exchange into its own preference shares to holders of the 600,000 £1 preference shares of the National Gas & Oil Engine Company. The basis of the offer is 11 Brush for every 10 National shares. The preference capital of both companies is in 5½ per cent. cumulative shares or stock. Brush Electrical is also reorganising its preference share capital structure by putting it on a basis which both preserves the value of the existing issued preference stock, and enables the company in the future to raise further preference share capital. It is proposed that no preference shares ranking in priority to the existing shares may be issued without the sanction of the holders, that an elastic limit varying with the amount of ordinary capital paid up be placed on the maximum amount of 5½ per cent. cumulative preference stock in issue, and that borrowings which are not temporary borrowings from bankers or others in the ordinary course of the business of the company and its subsidiaries shall not exceed one-half of the borrowing powers of the board.

Ministry of Transport Accident Report

Near Fishguard & Goodwick, July 11, 1951, Western Region, British Railways

Brigadier C. A. Langley, Inspecting Officer of Railways, Ministry of Transport, inquired into the collision which occurred at 6.48 p.m. on July 11, 1951, near Fishguard & Goodwick Station, when the 6.40 p.m. up passenger auto-train from Fishguard Harbour to Clarbeston Road, consisting of one coach drawn by an 0-6-0 tank engine, which had left the station without the electric train staff and against the starting signal at danger, was met head on by the 12.35 p.m. freight train from Llandilo, formed of a 4-6-0 tender engine hauling six empty vacuum-fitted vans, 15 loose coupled wagons, and a brakevan.

The auto-train had stopped just before the collision and was driven back 110 yd. The other train had reduced speed to about 20 m.p.h. No passenger was injured, but one afterwards complained of shock. Four railway servants were hurt, but only the auto-train driver was detained in hospital. The line remained blocked until 9.43 p.m. The weather was fine and the rails were dry. The accompanying diagram shows the lines, signals, and so on, essential to a general understanding of the case.

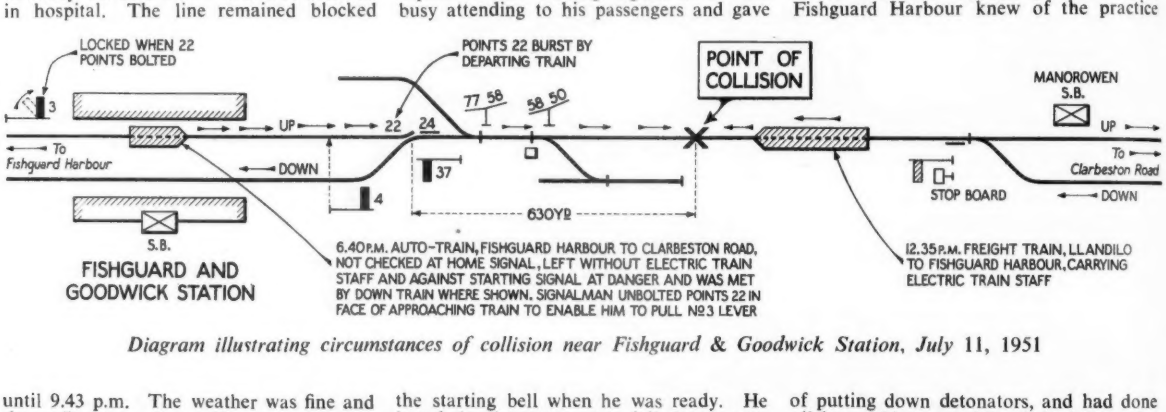


Diagram illustrating circumstances of collision near Fishguard & Goodwick Station, July 11, 1951

Although acceptance of up trains at Fishguard & Goodwick is governed by the double-line block regulations there is an additional instruction permitting acceptances which says that, except where instructions to the contrary are issued, the line must not be considered clear, nor a train be allowed to approach unwarned from the token station in rear until all points have been placed in their proper positions for its safety, and, further, that at a terminal station the line must be clear to the point the train usually runs to and the facing points set for the line concerned.

Evidence

The freight train was running late and the Fishguard & Goodwick signalman accepted it at 6.30 p.m. He had learned that it would not have to stop at the board at the top of the approach incline, and hoped he could get it clear of the single line before the departure time of the auto-train, which he accepted at 6.38 p.m. After receiving " entering section " for the latter he unbolted No. 22 points by replacing lever 24, although the down train was approaching; he was thus able to clear home signal No. 3. The auto-train stopped with its engine a few yards ahead of his box and remained for 5 to 6 min. When it left it exploded a number of detonators, and frequent blasts were sounded on its whistle, as there was a wedding party present and that was the local custom on such occasions.

Realising that the train was starting irregularly the signalman shouted and whistled and waved a red flag, but there was so much noise and other distractions that neither driver, fireman, nor guard heard the warning, and the train passed the starting signal and burst No. 22 points, relocked by the signalman as soon as the up home signal had been restored to danger. It was his custom to hand the staff personally to the driver or fireman; he never gave it to a member of the station staff. A porter and a clerk confirmed this evidence generally, but could not say who placed the detonators on the line. They agreed that it was the usual custom to do that when a wedding party was present.

The auto-train guard did not notice the aspect of the starting signal as he was busy attending to his passengers and gave the starting bell when he was ready. He heard the detonators, but failed to see or hear the signalman's warning. Feeling the brakes being applied, he looked out and saw the other train approaching.

The driver had been stationed at Goodwick for 32 years. Seeing the home signal off he ran into the platform. On receiving the right away bell he opened the regulator. He heard about six detonators and the fireman whistled two or three times. He had seen the wedding party as the train ran in. His fireman told him he had put down four detonators. Realising his mistake he stopped, and was on the point of moving backwards when the collision occurred. He was cleaning the blurred glasses of his lubricator at the station and just got them back in position when the starting bell sounded. He was not distracted by the wedding party and thought his attention being taken up with the lubricator made him forget the staff. Never before had he seen a clear signal to enter the up platform with a down train approaching. Usually he was stopped there until it had cleared the single line, but sometimes had been called forward to the platform by a green flag after the other train had stopped.

The fireman generally confirmed this evidence but said he only put down two detonators. He did not check that they had the staff before leaving nor observe the starting signal as he was helping with the lubricators and then firing. Their train moved back a little before the collision.

The freight train driver said he stopped at Letterston Junction, when the train was made up as described above, and tested the brake with 25 in. of vacuum showing. He stopped at the board, but with vacuum brake on the vans it was unnecessary to pin down brakes, and he started down the incline. The train was well under control and just on leaving a cutting the fireman shouted that there was another train in front. This distance was too short to stop in; the collision occurred at about 15 m.p.h. Both he and his fireman jumped clear in time.

His guard confirmed that the vacuum pipes of the six leading vehicles were coupled throughout and the brake tested. He did not pin any brakes down when they reached the stop board and the train was well under control when they reached the steep incline. He felt no emergency brake application.

The station and quay superintendent at Fishguard Harbour knew of the practice of putting down detonators, and had done all he could to stop it, and the locomotive foreman at Goodwick shed agreed that he had heard detonators on occasions, but had never been able to find out who placed them on the line. Eleven recently exploded were found from 5 to 25 yd. in front of the place where the auto-train engine had been standing, with a large number of others of older origin on the same length. It was considered that the driver of the freight train would not have seen the other until within approximately 200 yd. of it, but the fireman could at 25 yd. further.

Inspecting Officer's Conclusions

Primary responsibility rests on the auto-train driver who left without the staff, and against the starting signal, in full view 150 yd. ahead, and did not realise his grave mistake until he had nearly reached the point of collision. He is 54 with 32 years of service, eleven as a driver. His fireman took no steps to help him by checking that the staff was on the engine. He admitted placing the detonators and clearly was thinking more of the wedding party than his work. He is 28 with eleven years of service. It was not the guard's duty to observe the starting signal before ringing the bell, but he should have looked out after the train started and seen it was at danger. Had he taken prompt action the accident might have been avoided.

The freight train driver and fireman were keeping a good lookout and were in no way responsible for the collision. The

signalman did his best to attract the auto-train driver's attention, but it is hardly surprising that his shouts and whistles were not heard. He should not have unlocked No. 22 points in the face of the oncoming train, and in any event should have checked or stopped the auto-train at the home signal, with the starting signal at danger.

Remarks

This accident was due to the serious mistake of a driver, who broke the most fundamental rule of single-line working. Trap points or a sand drag would have prevented it and the provision of one of these safeguards is recommended if the practice is continued of accepting up trains into the platform with a down train approaching. It would be desirable to fix a subsidiary signal on the up home to call trains forward without hand signalling or unlocking the facing points, as occurred on this occasion. The present instruction regarding acceptance, with its reference to working in a terminal station, is clearly inapplicable, and as there does not appear to be any suitable regulation to cover this case Brigadier Langley suggests that a special instruction be issued.

Apparently blowing whistles and exploding detonators for wedding parties is a long-standing custom not confined to this station, but detonators are expressly provided to stop trains in the event of an emergency, not to speed them on the way. Instructions have now been issued prohibiting abuse of these valuable safeguards.

Institution of Railway Signal Engineers

Paper on signalling in Pakistan

At a meeting of the Institution of Railway Signal Engineers held in London on February 6 with the President, Mr. S. Williams, in the chair, a paper by Mr. H. F. Dennison, on modern developments in signalling on the Eastern Bengal Railway, Pakistan, was read on his behalf by Mr. L. W. H. Lowther, formerly Hon. Secretary of the Indian Section of the Institution.

The paper described the situation on the railways produced in the sub-continent by the creation of the State of Pakistan, and particularly the alteration in the flow of traffic on the different routes and the development of a new signalling policy, influenced by recent progress in applying power signalling to railways operating under similar conditions, enabling the working of the larger junction stations to be concentrated in fewer hands and the operation of crossing loops to be expedited. Comparative costs were given for various layouts, and the signal aspects, both running and shunt, with technical details of relay cabinets, contact type rail bonds, power supply apparatus, and so on, were described. Special attention was given to working single lines, and to methods of increasing their capacity by means of C.T.C. apparatus with additional controls to meet local requirements.

Mr. F. Horler, Past President, opening the discussion, said that the paper gave a picture of an engineer having to attempt a heavy task in a somewhat isolated way, and Mr. Dennison was to be congratulated on having set about it in such an up-to-date fashion. Some of the proposals for future work revealed a bold policy, but he was not clear how the author meant to carry out some of them relating to relay interlocking or for controlling the lighting of signals while trains were standing in crossing loops; the latter seemed open to criticism.

Mr. F. G. Hathaway said the alterations in the flow of traffic consequent on the creation of Pakistan had given the signal engineer a unique opportunity to justify improvements and additions to existing signalling. It was stimulating to read that Mr. Dennison was a champion of power working and to see what his attitude was to the retention of out-of-date methods. Signal engineers in some countries felt concern at having to maintain power apparatus with the facilities to hand, and he thought there would always be a demand for mechanical signalling in some circumstances. The proposal to bring C.T.C. panels under local operation should the line circuits fail and the author's approach lighting and "king switch" circuits, were most interesting.

Mr. J. E. Mott thought the figures comparing the cost of doubling a line and the provision of C.T.C. were on the low ratio side. Perhaps only short distances were under consideration and with longer ones the ratio might work out differently. It seemed a generous policy to provide duplicate circuits in buried cables and that would add considerably to costs. Had the author thought of applying A.P.B. circuits, they would, he felt, bring increased traffic capacity. The contact type of bond described in the paper would be of interest in other countries.

Mr. L. V. Pont thought it would be difficult to obtain the train frequency given, even with track circuiting, and the old Indian rules did not permit the speed mentioned for non-isolated stations, but perhaps this had been changed. On the old Eastern Bengal Railway they had not found that floods interfered with their track circuits.

Mr. A. N. McKillop preferred to see wires provided with identification sleeves, as it made matters much easier should anything become disconnected; that advantage would be lost with the author's methods. Some of the benefits provided by the layouts described appeared to come more from the provision of isolation than from power signalling as such.

Mr. J. F. H. Tyler found it difficult to see how so favourable a case could be made out for power signalling; here they had not been able to get such figures. Nor did it seem practicable to achieve the maintenance staff economies mentioned in the paper. He wondered how the special fishplate bonds would function when oiling was carried out and how good contact could be guaranteed at all times. Mr. B. R. Padmore referred to the difficulty of obtaining proof of open fishplates on long track circuits under bad ballast conditions. Mr. V. S. King spoke of flooding difficulties during monsoon periods and the use of steel sleepers in many places. Mr. H. C. Hodgson had had experience with counting mechanisms for checking the operation of emergency apparatus, similar to those referred to by the author.

The President, moving a vote of thanks to Mr. Dennison for his paper and to Mr. Lowther for reading it, and for giving a preliminary reply to the discussion, said that changes in costs of labour and materials had altered the picture of what could be gained from power signalling. Engineers here would be glad to have details showing how the author arrived at his figures. The signal aspects used at stations seemed inconsistent with the use of four-aspect signalling on through sections. The contact bond was interesting and showed, as did other practices such as the burying of cables, how in some places serious precautions against interference became essential. That would explain the author's preference for power apparatus over the existing double-wire equipment. The length of passing loops was an important point in all schemes of this kind. He had not yet heard of a trouble-free insulated rail joint and wondered if anybody else in this country had done so.

Contracts & Tenders

The Crown Agents for the Colonies have placed a contract with the Gloucester Railway Carriage & Wagon Co. Ltd. for 28 bogie goods brakevans.

The Canadian National Railways have placed an order, valued at more than $900,000 for 100 side and centre convertible dumping cars, with the Canadian Car & Foundry Co. Ltd. Delivery is to be in March, 1953. The vehicles can be operated as gondola cars with side unloading, or, by opening trap doors in the floor and moving the end in, they can be used as hopper cars. When the ends are turned down, the cars can be operated as drop-end gondolas for transporting such loads as telephone poles, lumber and structural steel.

The Government of New South Wales is inviting tenders for the supply of motor and trailer bogies for suburban and inter-urban cars. Further details are given under Official Notices on page 223.

The High Commissioner for India is inviting tenders for the supply of five narrow-gauge, two metre-gauge, and six broad-gauge locomotive boilers of types "ZE," "ZB," "YC" and "XF." Further details are given under Official Notices on page 223.

The Board of Trade Special Register Information Service has recently reported that the closing date of the call for tenders for the construction of a railway from Guija to the Rhodesian Frontier, which was issued by the Directorate of Ports, Railways & Transport of the Province of Mozambique, has now been fixed for March 15. The tender was previously referred to in our November 16, 1951, and February 1, issues.

AWARD TO THE AMERICAN CAR & FOUNDRY COMPANY.—The American Car & Foundry Company has received an award for its entry in the first annual competition sponsored by the Association of Railroad Advertising Managers. It was judged the winner in the Promotion of Rail Traffic category. Mr. A. W. Eckstein, Advertising Manager, Illinois Central Railroad, presented to the company a bronze plaque, which reads: "For Its Outstanding Contribution Through Advertising to the Development of Traffic on the American Railroads."

Notes and News

Planner Rate Fixer Required.—A planner rate fixer is required for locomotive and erecting shops. See Official Notices on page 223.

Port of London Authority.—Applications are invited for the post of assistant engineer, drawing office. Candidates should be not over 45 years of age. See Official Notices on page 223.

Vacancy for Works Manager.—Applications are invited for the post of Works Manager, between 35 and 40 years of age, for locomotive workshops, Southern Railway of Peru. See Official Notices on page 223.

Vacancy for Senior Engineer.—A company manufacturing diesel-electric locomotives requires the services of a senior engineer with experience and ability in the electrical and mechanical design of d.c. traction motors and generators. See Official Notices on page 223.

Production Development Engineer Required.—A company manufacturing electric traction equipment invites applications for the post of production development engineer to take full charge of the manufacture of d.c. traction motors and generators. See Official Notices on page 223.

Inter-Allied Railway Club Reunion in Paris.—The annual gala and ball of the Foyer Interallié des Chemins de Fer, Paris, "La Nuit Européenne de la Locomotive '52'," arranged for February 29, as described in our issue of February 15, has been postponed to April 25, as a mark of respect to the memory of the late King George VI. The reunion will be held at the Aéro-Club, Paris, and the other arrangements will remain as before. Tickets and information may be obtained from the Foyer Interallié des Chemins de Fer, 11, Rue de Milan, Paris, 9e.

Weekend Discharge of Wagons.—During January, some 47,500 wagons were discharged each weekend outside normal working hours by British Railways staff and by traders.

British Railways Coal and Steel Carryings.—British Railways cleared 396,620 tons of coal from deep-mine pits and opencast sites during the 48 hr. ended 6.0 a.m. on February 18, against 372,120 for the previous weekend. The total for the week was 3,190,820 tons. During the week ended February 9, 199,805 tons of iron and steel were conveyed from the principal steel works.

Withdrawal of Passenger Service on Bishops Stortford and Braintree Branch.—The passenger train service is to be withdrawn on the Bishops Stortford and Braintree Branch, Eastern Region, from March 4. Stations affected include Dunmow and Felsted. The Eastern National Omnibus Co. Ltd. operates a bus service between Bishops Stortford and Braintree. Railway Executive cartage services will continue to be available for parcels traffic.

Trains Held up by Snowdrifts in Austria and Jugoslavia.—The "Simplon Orient Express" ran into snowdrifts after leaving the Jugoslav frontier sation of Sezana on February 14 and had to return to Sezana while snowploughs tried to clear the line through the mountains of Slovenia to Ljubljana. The snowfall in Slovenia is stated to be the worst for a century, and heavy falls are reported from the Austrian provinces of Styria and Carinthia. Two trains from Rome failed to reach Vienna; one was snowbound in the Semmering, the other on the Italian side of the Italo-Austrian border.

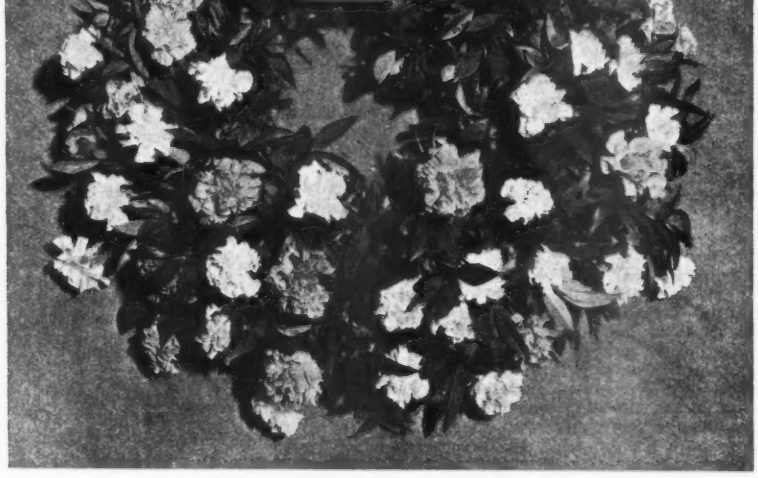
Institution of Railway Signal Engineers.—Mr. D. G. Shipp will read a paper entitled "The Track Circuit," before the Institution of Railway Signal Engineers on March 5. The meeting will be held at the Institution of Electrical Engineers, Savoy Place, W.C.2, at 6 p.m.

General Motors Diesel Limited.—It was stated in error in our issue of November 2, 1951, that diesel locomotives of the Electro-Motive type for three railways in U.S.A., the Père Marquette Division of the Chesapeake & Ohio Railway, the Great Northern Railway, and the Wabash Railroad, had been built at a new subsidiary works of the General Motors Corporation at London, Ontario, to relieve pressure on the main Electro-Motive works in the U.S.A. We are informed that General Motors Diesel Limited, of London, Ontario, which built the locomotives, is not a subsidiary of the Electro-Motive Division of the General Motors Corporation, but a separate, wholly-owned subsidiary of the Corporation, and that the locomotives were for use only on the Canadian lines of the three U.S.A. railways named.

F.B.I. Views on Initial Tax Allowances.—The Federation of British Industries, in a statement last week on the report of the Committee on the Taxation of Trading Profits, published last April, says that the committee's suggestion that the amount of initial allowances and liability to tax should depend upon the estimate by the Treasury of the importance of the industry to the national economy, offends an elementary principle of taxation. In general, it is stated, the tax charge should depend on the amount of income or profits and not on an estimate of the importance of the activities giving rise to the income or profits. Deductions for fixed assets should be such that they represent a due proportion for the year of the value at current prices of the assets utilised. A similar principle, the statement continues, applies to the deduction to be made for stocks used up during the year. Many industrial concerns, the F.B.I. points out, have made additional provisions in their accounts so as to provide funds for replacement of plant at current costs, but those provisions are not allowed as deductions in tax assessments. It is suggested that the simplest method of solving the problem, so far as fixed assets are concerned, is for additional allowances to be given distinct from normal wear and tear allowances.

Railway Benevolent Institution. — The General Secretary of the Railway Benevolent Institution draws attention to the possibility of subscribing to the Institution by deed of covenant, thereby enhancing the value of the contribution without any additional cost to the donor. If, he points out, the contributor enters into a deed of covenant to pay a charity a fixed annual sum for seven years (or during lifetime, whichever is the shorter period) out of income already taxed at the full standard rate, then the amount legally becomes the income of the charity and the income tax paid thereon by the contributor can be reclaimed by the charity from the Inland Revenue authorities. For example, a con-

British Railways Tribute



Wreath sent by officers and staff of British Railways in memory of King George VI

OFFICIAL NOTICES

GOVERNMENT OF NEW SOUTH WALES TENDERS are invited for the supply of:—Motor and Trailer Bogies for Suburban and Inter-urban Cars to Department of Railways Specification No. 2236. Alternative tenders are required for:—(*a*) 344 Motor Bogies and 536 Trailer Bogies; (*b*) 466 Motor Bogies and 634 Trailer Bogies; (*c*) 550 Motor Bogies and 730 Trailer Bogies. Particulars and forms of tender can be obtained by *bona fide* tenderers upon application to the undermentioned address, to which tenders are returnable NOT LATER than TWELVE NOON on WEDNESDAY, APRIL 30, 1952. (Reference F.7099.) AGENT-GENERAL FOR NEW SOUTH WALES, 56/7, Strand, London, W.C.2.

FACTORY possessing Machine Tools to the value of £1,000,000 is desirous of selling entire plant. Machines of all types offered. Quick sale is essential for accommodation reasons. Only enquiries for specific Machines replied to. Box 405, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

THE High Commissioner for India invites tenders for the supply of:—Group 5—5 Narrow Gauge 2 Metre Gauge and 6 Broad Gauge Locomotive boilers types ZE, ZB, YC and XF. Forms of tender may be obtained from the DIRECTOR-GENERAL, INDIA STORE DEPT., 32/44, Edgware Road, W.2., at a fee which is not returnable, of 10s. Tenders are to be delivered by 2 p.m. on Friday April 25, 1952. Please quote the reference S4788/51 in your application.

A COMPANY manufacturing electric traction equipment invites applications for the post of Production Development Engineer to take full charge of the manufacture of D.C. Traction Motors and Generators. Applicants should possess first-class practical engineering ability and must have a wide experience of D. C. Traction machine manufacture. They will be required to work in conjunction with design Departments and will be fully responsible for the product. The post will carry a salary commensurate with the responsibility and a figure of £850 per annum is envisaged. Applications, which will be treated in strict confidence, giving full details of past experience, qualifications, etc., should be sent to Box 406, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

THE PERUVIAN CORPORATION LIMITED — CIVIL ENGINEERING DRAUGHTSMAN for Southern Railway of Peru, age 25 to 30. Knowledge of instrument work, design of reinforced concrete and steel constructions and some practical experience. Duties not confined to drawing office. Scope for energetic worker. Apply to the Secretary, 144, Leadenhall Street, London, E.C.3.

THE PORT OF LONDON AUTHORITY invite applications for appointment as Assistant Engineer, Drawing Office; scale of pay £800 by £50 to £1,000 per annum. Preference will be given to candidates not over 45 years of age who are Corporate Members of the Institution of Civil Engineers or the Institution of Structural Engineers with experience in the design and detailing of reinforced concrete, steel, timber and masonry of buildings, quays, jetties, bridges, walls, piling, etc., and accustomed to organising the work of designers and draughtsmen. The successful candidate will be required to become a member of the Port of London Authority's contributory superannuation scheme. In certain cases existing pensionable service is transferable. Application should be made on a form to be obtained from the Establishment Officer, Port of London Authority, Trinity Square, E.C.3, which should be completed and returned not later than March 1, 1952.—F. W. NUNNELEY, Secretary.

A COMPANY manufacturing diesel-electric locomotives requires the services of a Senior Engineer with wide experience and first class ability in the electrical and mechanical design of D.C. Traction Motors and Generators. The post would be a senior one and would carry a salary of about £1,800 per annum, depending on qualifications and experience. An advantageous Staff Assurance Scheme is in operation and the successful applicant will be given a three year contract. Applications will be treated with strict confidence. Replies giving full details of experience to Box 401, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

WORKS MANAGER for Locomotive Workshops, Southern Railway of Peru required. Must be a Mechanical Engineer with practical locomotive workshop experience. Preferably 35/40 years of age and with a knowledge of the Spanish language. Apply to the Secretary, PERUVIAN CORPORATION LIMITED, 144, Leadenhall Street, London, E.C.3.

WE buy used or unserviceable Steel Files at good prices in lots of 2 cwt. or more.—THOS. W. WARD LTD., Reusable Steel Dept., Albion Works, Sheffield.

FOR SALE: Broadbent 6-ft. Heavy Duty Boring and Facing Lathe. With 5-ft. 6-in. gear-driven chuck. All-geared head driven by 15-h.p. motor, 400/3/50. Wt. about 13 tons.—H. BELL (MACHINE TOOLS) LTD., Walter Street, Leeds, 4. Tel. 37398.

DRAUGHTSMAN required, preferably with Steel Car or Diesel Rail Car experience. 5-day week. Pension Scheme in operation. Apply—GLOUCESTER RAILWAY CARRIAGE & WAGON COMPANY, Gloucester.

PLANNER Rate Fixer wanted for locomotive boiler and erecting shops. Apprentice-trained engineer with previous locomotive experience is required. Staff appointment with Pension Scheme. Write for application form to General Manager, YORKSHIRE ENGINE CO. LTD., Meadow Hall Works, Wincobank, Sheffield.

SENIOR & Junior design engineers and draughtsmen required in London for work on the electrical and mechanical design of traction motors, generators, and control equipment for diesel electric locomotives. Men with first class experience in traction work are required for the senior posts. Good salaries will be paid, and there is a generous staff assurance scheme. Please apply with full details of training, experience, age, etc., to Box 369, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

THE appointment of Chief Accountant and Company Secretary is vacant in a large independently owned Departmental Store. Commencing remuneration £1,750 per annum. The appointment is an important one requiring experience and ability and applications therefore are only invited from those, of 40 years of age and under, holding the rank equivalent to that of Deputy Borough Treasurer or Chief Assistant in Local Government Service. For fuller details and for an application form write to the Managing Director, JAMES BEATTIE LIMITED, Victoria Street, Wolverhampton, not later than the 29th February, 1952.

A SENIOR mechanical design engineer is required by a Company manufacturing diesel-electric locomotives as Assistant to the Chief Mechanical Designer. Applicants should preferably have wide experience of either bogie, underframe or superstructive design, and the application of welding technique to this class of work. A first class electric locomotive or coach designer is envisaged as being the most suitable, but applications will also be considered from men without previous rolling stock experience whose qualifications and training are suitable. Write giving particulars of age, experience, qualifications and salary required to Box 396, *The Railway Gazette*, 33, Tothill Street, London, S.W.1.

BOUND VOLUMES.—We can arrange for readers' copies to be bound in full cloth at a charge of 25s. per volume, post free. Send your copies to the SUBSCRIPTION DEPARTMENT, Tothill Press Limited, 33, Tothill Street, London, S.W.1.

JUST PUBLISHED.—Twenty-Five Years of the North Eastern Railway, 1898-1922. By R. Bell, C.B.E., Assistant General Manager, N.E.R. and L.N.E.R. Companies, 1922-1943. Full cloth. Cr. 8vo. 87 pages. 10s. 6d.—*The Railway Gazette*, 33, Tothill Street, London, S.W.1.

tributor remitting £1 will furnish a reclaim form for 18s. 1d., on the basis of tax at 9s. 6d. in the pound. Thus by completing the deed a contributor will augment his contribution by as much as 90 per cent. Because of a possible change in rates of income tax, no definite gross sum can be named in the deed; hence the words "such a sum as will after the deduction of income tax," etc., which appear in it. Any changes would not vary the amount payable by the contributor, but would increase or decrease the gross amount receivable by the Institution to the extent of the variation in the amount of tax which the Institution could reclaim. Contributions are urgently required. Deed of covenant forms may be obtained from Mr. H. C. Walton, General Secretary, the Railway Benevolent Institution, 23, Gordon Square, London, W.C.1.

Conveyancer Fork Trucks Film.—A film "Fork Lightening," with commentary by Alvar Liddell, and running time of 25 min., has been produced by Cinechrome Limited, Bournemouth, on behalf of Conveyancer Fork Trucks Limited, Liverpool Road, Warrington, and describes the activities and products of the firm. In his opening remarks before a recent showing of the film, Mr. C. W. Sharp, Managing Director of Conveyancer Fork Trucks Limited, said that the film had been distributed for showing in countries where it was important to give a background of the manufacturing company and its resources with an indication of its manufacturing facilities; it covered manufacture and technical points, and was another way of explaining to potential users just how valuable the fork truck could be. He pointed out the importance attached to fork trucks by the various productivity teams which had visited U.S.A. Conveyancer Fork Trucks Limited, he added, had made all types, including straight petrol gearbox, petrol electric, battery electric, diesel gearbox, and diesel or petrol with torque convertor. In addition the company had used pneumatic and solid tyres with three- and four-wheel layouts, and the two latest models introduced novel features, shown in the film, which were the result of this experience.

Institute of Traffic Administration 1952 Examinations.—The Institute of Traffic Administration announces that examinations in the elementary and intermediate stages of the syllabus will be held on Friday and Saturday, May 2 and 3, at centres to be decided according to requirements. Intending candidates are reminded that completed applications to sit for the examinations must be in the hands of the Secretary, at Dudley House, Southampton Street, London, W.C.2, by March 3.

London Midland Region Station Closings.—The London Midland Region announces that the following stations will be closed on and from March 3 for passengers, parcels, and passenger train merchandise: Camerton (between Cockermouth and Workington); Rumworth & Daubhill (between Bolton and Kenyon Junction); Chequerbent (for Hulton Park) (between Bolton and Kenyon Junction); and Elslack (between Colne and Skipton). Elslack will also be closed for freight traffic, for which alternative arrangements have been made. Blencow (between Penrith and Keswick) will be closed for passenger traffic on the same date.

Road Haulage Association Limited.—The Minister of Transport, Mr. J. S. Maclay, will be the principal guest at the Road Haulage Association Annual Luncheon, to be held at Grosvenor House, Park Lane, London, W.1, on Tuesday, May 13.

Great Northern Victoria Hotel, Bradford.—The Great Northern Victoria Hotel, Bradford, owned by the British Transport Commission, was withdrawn at £46,000 when offered as a going concern at a Bradford auction sale recently. It was stated afterwards that negotiations had begun for the sale of the hotel.

Increased Charges for Couchettes, French Railways.—The following increased sterling charges payable in the United Kingdom for *couchettes*, first or second class, on the French National Railways have been introduced: *couchettes* to destinations in France, including reservation fee, 19s. per berth; *couchettes* to destinations in Switzerland, including the reservation fee, £1 1s. 6d. per berth.

Devon General Omnibus & Touring Co. Ltd.—A final ordinary dividend for 1951 of 10 per cent., plus a bonus of 15 per cent., making 35 per cent. for the year, was declared by the Devon General Omnibus &

Touring Co. Ltd. The net profit was £58,319 (£70,278 for the previous year) after providing £67,882 (£62,436) for depreciation and £27,500 (£27,500) for taxation. The sum of £14,100 (£32,000) has been transferred to general reserve; the balance to be carried forward is £97,806 (£95,849).

Forthcoming Meetings

February 22 (*Fri.*).—Permanent Way Institution, Manchester & Liverpool Section, at the L.M.R. Crewe Ambulance Centre, at 7 p.m. Films: "Track Buckling" and "Rail Creep Adjustment."

February 23 (*Sat.*).—Railway Students' Association. Visit to Doncaster and York.

February 25 (*Mon.*).—London Industrial Co-ordinating Committee of the Royal Society for the Prevention of Accidents. Accident Prevention Conference at Caxton Hall from 10.15 a.m. to 4.30 p.m.

February 26 (*Tue.*).—British Railways, Southern Region, Lecture & Debating Society, at the Chapter House, St. Thomas's Street, S.E.1, at 5.45 p.m. Members' night.

February 26 (*Tue.*).—Institute of Transport. Informal Luncheon at the Connaught Rooms, Great Queen Street, W.C.2, at 12.30 for 1 p.m. Speaker: Mr. Geoffrey Crowther, Editor of *The Economist*.

February 27 (*Wed.*).—Railway Students' Association, at the London School of Economics & Political Science, Houghton Street, W.C.2, at 6 p.m. "Training for Transport," by Mr. Frank Gilbert, Principal Staff Officer, British Transport Commission.

February 28 (*Thu.*).—Institution of Civil Engineers, Great George Street, Westminster, S.W.1, at 5.30 p.m. Discussion: "Relative Economics of Pre-Stressed Concrete, Compared with Reinforced Concrete, Steel, and Other Forms of Construction."

February 28 (*Thu.*).—Institution of Electrical Engineers. Annual Dinner, at Grosvenor House, Park Lane, W.1, at 7 for 7.30 p.m.

February 28 (*Thu.*).—British Railways, Western Region, London Lecture & Debating Society, in the Clerks' Dining Club, Bishops Bridge Road, W.2, at 5.45 p.m. "Railway Architecture," by Mr. H. E. B. Cavanagh, Architect, Western Region.

February 29 (*Fri.*).—Institution of Mechanical Engineers, Storey's Gate, St. James's Park, S.W.1, at 5.30 p.m. "Gear-Tooth Stresses and Rating Formulae," by Dr. H. E. Merritt.

February 29 (*Fri.*).—Royal Engineers (Railway Operating Division) Officers' Annual Reunion Dinner, at the Transportation Club, 44, Wilton Crescent, S.W.1, at 6.30 for 7 p.m. Colonel V. M. Barrington-Ward, will preside.

March 1 (*Sat.*).—Railway Students' Association. Visit to Doncaster and York.

March 1 (*Sat.*).—British Railways, Southern Region, Lecture & Debating Society. Visit to Toton marshalling yard.

March 3 (*Mon.*).—Institute of Transport, Metropolitan Section, at 80, Portland Place, W.1, at 5.30 for 6 p.m. "The Organisation and Progress of the Ulster Transport Authority," by Mr. J. A. Clarke, General Manager, Ulster Transport Authority.

Railway Stock Market

Recent factors dominating stock markets have been more marked, namely, a general tendency for buyers to await the Budget, selling by investors to provide cash to take up new shares offered on attractive terms, and weakness in rubber shares on the fall in the price of the commodity. British Funds have again eased, particularly existing 3½ per cent. stocks, which were affected by the attractive terms of the new issue of 3½ per cent. stock by Uganda. Although industrial shares were again lower, declines on balance were relatively small. It is felt that industrial shares have been reduced in many cases to levels which more than discount the possibility that E.P.T. may be at 100 per cent. on increased profits over the average of the past three years; and that if after all the rate of this new tax were less than this, many shares would rally strongly after the Budget.

There is in any case little likelihood of higher dividends because of the incidence of E.P.T.; but many shares are now at levels giving attractive yields on the basis of dividends at last year's rates. The City is still hopeful that if E.P.T. is at 100 per cent. there may also be some modification of the existing profits tax. On the other hand, there are fears that a fresh taxation of same kind, apart from E.P.T., may be proposed in the Budget as an additional check to inflation.

Foreign rails attracted rather more business, though price movements generally were small. Buyers were about for Leopoldina stocks in the belief that their total pay-outs will exceed current market prices. Leopoldina ordinary has strengthened to 11⅛ at the time of going to press, and the 5½ per cent. preference to 28⅛. Elsewhere, Leopoldina Terminal 5 per cent. debentures were quoted at 15½ "ex" their capital return; the ordinary units were 9d.

There was again a fair amount of business in Antofagasta with the ordinary stock at 16, though the preference receded to 66. Mexican Central "A" debentures firmed up to 86½, but in other directions, Manila "A" debentures receded to 68 and the preference shares were again 6s. 9d.

San Paulo 10s. ordinary units continued to encounter a little selling and eased to 14s. 1½d. Brazil Rail bonds were 5¼. French railway sterling bonds strengthened with Midi and Orleans both at 84.

Taltal shares were less active and quoted at 19s. 6d. and Nitrate Rails 22s. 9d. United of Havana stocks continued to attract some attention on take-over hopes; the 1906 debentures firmed up to 18¼.

Canadian Pacifics were steadier around $65½, with the preference and debenture stocks at 63¼ and 80 respectively.

Chilean Northern 5 per cent. first debentures have changed hands at 39½. Bolivar "C" debentures were 47½ and La Guaira & Caracas ordinary stock changed hands around 98. Dorada ordinary stock was quoted at 40½. Costa Rica Railway ordinary and 6½ per cent. debentures were at 5½ and 47½ respectively.

Nyasaland Railways 3½ per cent. debentures changed hands around 75½. White Pass Yukon 4½ per cent. debentures and 5 per cent. debentures were 29 and 31 respectively. Egyptian Delta Light Railways 5 per cent. debentures were quoted at the wide price of 55-75.

Road Transport shares showed small mixed movements with Southdown at 93s. 9d., West Riding lower at 37s. Lancashire Transport 51s. 6d. and Potteries Motor Traction were dealt in around 40s. 3d.

Engineering shares generally were moderately lower, sentiment having been affected by fears of a coming further increase in the price of steel. Buyers, however, were tending to come in later because, it is contended, most engineering companies will have a satisfactory standard in regard to E.P.T.

Although there will be little scope for higher dividends, in most cases there will be good prospects of dividends being maintained, and on this basis yields at current prices seem attractive. At 48s. 6d., Guest Keen, for instance, yield nearly 5¼ per cent., Babcock & Wilcox at 66s. over 5⅛ per cent., while Vickers at 44s. 3d. yield 5⅛ per cent. and T. W. Ward at 70s. over 5⅓ per cent. There has been a big business in Imperial Chemical new shares at around 1s. over the issue price of 40s. 6d. The old shares were 42s. "ex rights" to the new. Thornycroft rose sharply to 56s. 3d.

Among locomotive builders and engineers, buyers were tending to come in because of the good yields and expectations that dividends will be maintained. Beyer Peacock, for instance, at 31s. yield 6⅛ per cent. on the basis of a dividend of 10 per cent. expected in the market. Hurst Nelson were 53s., Birmingham Carriage 33s. 6d. and North British Locomotive 16s. 1½d., Vulcan Foundry 21s. 9d., Wagon Repairs 5s. shares 10s. 6d., Gloucester Wagon 13s. 4½d., and Charles Roberts 21s. 9d.

Traffic Table of Overseas and Foreign Railways

	Railway	Miles open	Week ended	Traffics for week: Total this year	Traffics for week: Inc. or dec. compared with 1949/50	No. of week	Aggregate traffics to date: Total 1950/51	Aggregate traffics to date: Increase or decrease
South & Cen. America	Antofagasta	811	8.2.52	£ 142,220	£ + 62,050	6	£ 821,680	£ + 238,130
	Costa Rica	281	Jan., 1952	c1,495,633	+ c340,108	31	c8,756,306	+ c1,420,052
	Dorada	70	Nov., 1951	33,765	− 3,207	48	394,882	− 33,323
	Inter. Ctl. Amer.	794	Dec., 1951	$1,148,425	− $56,983	52	$13,126,431	− $339,796
	Paraguay Cent.	274	28.12.51	G289,547	+ G102,688	26	G8,823,911	+ G3,556,978
	Peru Corp.	1,050	Jan., 1952	$8,777,000	+ $758,000	30	$58,048,000	+ $3,899,000
	" (Bolivian Section)	66	Jan., 1952	Bs.16,004,000	+ Bs.1,517,000	30	Bs.111,091,000	+ Bs.26,690,000
	Salvador	100	Nov., 1951	c140,000	− c28,000	22	c635,000	+ c112,000
	Taltal	147	Jan., 1952	$2,649,000	+ $1,043,000	30	$14,926,000	+ $4,063,000
Canada	Canadian National†	23,473	Nov., 1951	18,035,000	+ 403,000	48	190,178,000	+ 22,295,000
	Canadian Pacific†	17,037	Dec., 1951	11,865,000	+ 591,000	52	142,771,000	+ 16,779,000
Various	Barsi Light*	167	Jan., 1952	23,812	− 5,220	42	332,580	+ 46,612
	Gold Coast	536	Dec., 1951	378,543	+ 72,605	39	2,473,919	+ 208,373
	Mid. of W. Australia	277	Nov., 1951	62,093	+ 22,023	22	304,756	+ 111,372
	South Africa	13,398	19.1.52	1,959,342	+ 214,175	42	80,114,580	+ 8,271,548
	Victoria	4,744	Oct., 1951	2,172,730	+ 1,149,080	17	—	—

* Receipts are calculated at 1s. 6d. to the rupee † Calculated at $3 to £1